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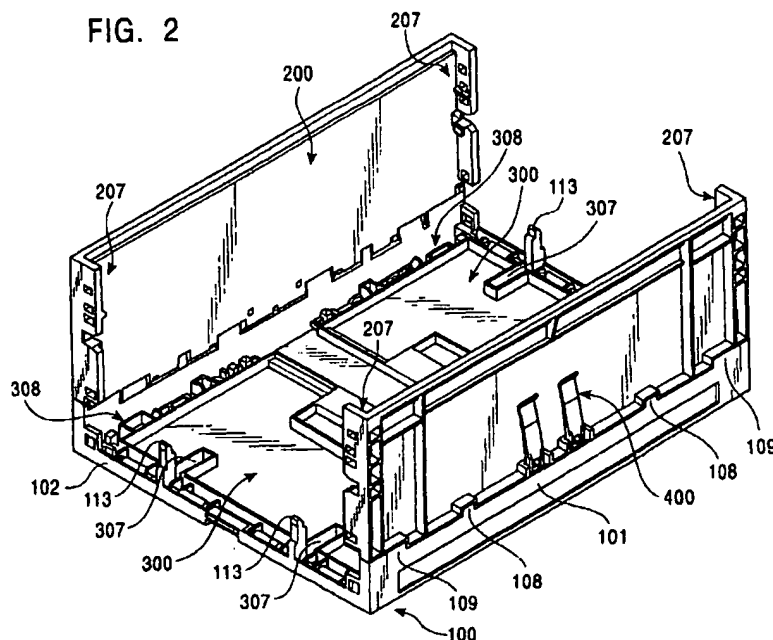
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(54) **Collapsible container**

(57) The present invention relates to a folding container comprising a bottom portion 100 having locking blocks 108, 109, 113 formed thereon and on which the bottom portion of a folded folding container can be fitted, and side walls having recesses 210, 307 formed therein and each having an open underside into which the corresponding locking block of an assembled folding container can be inserted, wherein engagement frame sections 207, 308 are used to mutually engage the side walls and to engage the side walls with the bottom portion. Therefore, folded folding containers can be stably stacked up, and the folding container can be strongly assembled in the form of a box because the engagement frame sections are used to mutually engage the side walls and to engage the side walls with the bottom portion (Fig. 2).

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## Description

### Field of the Invention

[0001] The present invention relates to a folding container comprising side walls disposed in a fashion surrounding a bottom portion and which can be folded so as to overlap the bottom portion.

### Background of the Invention

[0002] By way of example, a folding container is conventionally known which comprises long side walls connected via a hinge section to opposed long side portions of a bottom portion of the container formed to have a generally rectangular planar shape and short side walls connected also via a hinge section to opposed short side portions of the bottom portion.

[0003] This folding container is configured as follows: to fold the container, the short side walls are folded so as to overlap the bottom portion, and the long side walls are further folded onto the short side walls. Then, the folded long side walls are stood up perpendicularly to the bottom portion, and the folded short side walls are then stood up perpendicularly to the bottom portion to assemble the box-shaped folding container.

[0004] When the folding container is folded, the bottom portion is located at the bottom, the short side walls, which are folded so as to overlap the bottom portion, are located thereon, and the long side walls, which are folded so as to overlap the short side walls, are located thereon. To stack up folding containers folded in this manner, the bottom portion of an upper folded folding container is placed on the long side walls of a lower folded folding container. In addition, the folding container has generally L-shaped fitted shoulder sections each formed near a corresponding one of lower corners (located on the bottom portion side) of the long side walls thereof, so that when the container is folded, the fitted shoulder sections, each having a generally L-shaped planar shape, are each located at a corresponding one of the four corners of the two long side walls. Since the folding container is configured so that in stacking up folded folding containers, the bottom portion of an upper folded folding container is fitted in the shoulder sections located at the four corners of the two long side walls of a lower folded folding container, horizontal movement of the upper folded folding container relative to the lower folded folding container is limited to allow a large number of folded folding containers to be stacked up stably to prevent collapse.

[0005] As described above, in the conventional folding container, the fitted shoulder sections are each formed near the corresponding one of the lower corners of the long side walls of the folding container so as to stably stack up folded folding containers. In the assembled folding container, however, the fitted shoulder sections project from the long side walls. Consequently, if

two assembled folding containers are arranged in juxtaposition in a manner such that the long side walls of one of the containers abut on the corresponding long side walls of the other, an unwanted gap is created between the folding containers arranged in juxtaposition to increase a storage space for the assembled folding containers, thereby reducing storage efficiency. In addition, the fitted shoulder sections disadvantageously increase the thickness of each long side wall, so that the assembled folding container has a small internal volume compared to its outside dimensions, resulting in a reduced accommodation efficiency.

[0006] Additionally, since the long side walls insufficiently engage with the short side walls when the conventional folding container is assembled, the long and short side walls may be mutually disengaged when a load is imposed on these side walls from above, for example, when the assembled folding containers are stacked up.

[0007] Further, when a load is imposed on the long and short side walls of the conventional folding container from above, this load is effected on the hinge section coupling the bottom portion to the long and short side walls, whereby the hinge section may be damaged.

[0008] Further, since the conventional folding container has a problem with the structure of the hinge section coupling the bottom portion to the long and short side walls, it cannot be assembled easily by hinging the bottom portion to the long and short side walls.

[0009] Additionally, card holders disposed on the conventional folding container are manufactured separately from the other components before being attached to the long or short side walls. This attachment requires a large amount of time and labor to increase the price of the folding container.

### Summary of the Invention

[0010] It is an object of the present invention to solve the above described problems with the conventional folding container to provide a folding container that can be handled more easily and accommodated more efficiently.

[0011] To attain this object, the present invention is a folding container comprising side walls disposed in a fashion surrounding a bottom portion thereof and which can be folded so as to overlap the bottom portion, the side walls each having engagement frame sections formed thereon for mutually engaging the adjacent side walls so that when stood up perpendicularly to the bottom portion, the side walls will not fall down inward. In this folding container, first, the bottom portion has locking blocks formed thereon and on which the bottom portion of an assembled folding container can be fitted, the side walls each have recesses formed therein and each having an open underside into which the corresponding engagement block of an assembled folding container can be inserted, and the engagement frame sections

are used to mutually engage the side walls and to engage the side walls with the bottom portion. Second, one of the opposed side walls has through-holes into which the corresponding engagement block, which projects upward, can be inserted upon folding. Third, engagement projections formed on the engagement frame sections of each side wall are configured to fit in the corresponding through-hole in each fitting section formed in the bottom portion. Fourth, when the side walls are stood up perpendicularly to the bottom portion, a bottom surface of each side wall partly comes in surface contact with a top surface of the bottom portion. Fifth, card presser pieces each constituting a card holder are integrated with the side wall via a thin connection section.

#### Brief Description of the Drawing

[0012] Figure 1 is a perspective view showing how a folding container according to the present invention is assembled.

[0013] Figure 2 is a perspective view showing that the folding container according to the present invention is being assembled.

[0014] Figure 3 is a perspective view showing that the folding container according to the present invention is folded.

[0015] Figure 4 is a perspective view of a bottom portion of the folding container according to the present invention.

[0016] Figure 5 is an exploded fragmentary perspective view showing the bottom portion and long side walls of the folding container according to the present invention to explain hinging between the bottom portion and the long side walls.

[0017] Figure 6 is an exploded fragmentary perspective view of neighborhoods of ends of the bottom portion and long side walls of the folding container according to the present invention.

[0018] Figure 7 is a rear perspective view showing how the folding container according to the present invention is folded.

[0019] Figure 8 is a perspective view of the long side wall of the folding container according to the present invention.

[0020] Figure 9 is a fragmentary perspective view of the long side wall of the folding container according to the present invention.

[0021] Figure 10 is a vertical sectional view of the long side wall and a short side wall of the folding container according to the present invention before engagement frame sections of the long and short side walls are mutually engaged.

[0022] Figure 11 is a perspective view of the short side wall of the folding container according to the present invention.

[0023] Figure 12 is a fragmentary perspective view of the short side wall of the folding container according to the present invention.

[0024] Figure 13 is a vertical sectional view of the long side wall and short side wall of the folding container according to the present invention after the engagement frame sections of the long and short side walls have been mutually engaged.

[0025] Figure 14 is a vertical sectional view including the bottom portion and a hinge section of the long side wall of the folding container according to the present invention.

[0026] Figure 15 is a vertical sectional view including the bottom portion and the hinge section of the long side wall of the folding container according to the present invention immediately before the bottom portion and the hinge section are coupled together.

[0027] Figure 16 is an enlarged perspective view showing a card holder before assembly, the card holder being disposed on the long side wall of the folding container according to the present invention.

[0028] Figure 17 is a vertical sectional view showing the card holder before assembly, the card holder being disposed on the long side wall of the folding container according to the present invention.

[0029] Figure 18 is a fragmentary vertical sectional view showing the card holder after assembly, the card holder being disposed on the long side wall of the folding container according to the present invention.

[0030] Figure 19 is a perspective view of the long side wall of the folding container according to the present invention with the card holders disposed thereon.

#### Detailed Description of the Preferred Embodiments

[0031] An embodiment of the present invention will be described below, but the present invention is not limited to this embodiment as long as the spirits thereof are maintained.

[0032] 100 is a bottom portion having a rectangular planar shape. The bottom portion 100 comprises opposed long side portions 101 each having a long side wall 200 connected thereto via a hinge section, described later, and opposed short side portions 102 each having a short side wall 300 connected thereto also via a hinge section.

[0033] As shown in Figure 1, to fold a folding container assembled in the form of a box, the short side walls 300 are first brought down inward of the folding container to overlap the bottom portion 100, as shown in Figure 2. Then, the long side walls 200 are similarly brought down inward of the folding container to overlap the bottom portion 100 and the short side walls 300, as shown in Figure 3. On the contrary, to assemble, as shown in Figure 1, the folding container folded as shown in Figure 3, the long side walls 200, overlapping the bottom portion 100 and the short side walls 300, are stood up perpendicularly, and the short side walls 300 are stood up perpendicularly to assemble the folding container in the form of the box.

[0034] Next, the bottom portion 100 will be explained

chiefly with reference to Figures 4 to 7.

**[0035]** The bottom portion 100 has a bottom plate 103 having an inverted generally U-shaped double wall section 104 formed at each long side edge thereof, the double wall section 104 constituting the long side portion 101 of the bottom portion 100. The double wall section 104 comprises an outer wall 104a, an inner wall 104b, and a horizontal wall 104c connecting an upper end of the outer wall 104a and an upper end of the inner wall 104b together. A rear surface 103a of the bottom plate 103 is located below a lower end 104a' of the outer wall 104a, and a portion of the bottom plate 103 which is located below the lower end 104a' of the outer wall 104a constitutes a bottom fitting section 100a, described later. The outer wall 104a constituting the double wall section 104 is extended upward to form a laterally elongated end wall 105 all along the long side portion 101 except for both ends thereof.

**[0036]** In addition, plate pieces 106a is extended upward generally perpendicularly from the upper end of the inner wall 104b constituting the double wall section 104. Each of the plate pieces 106a has a generally semi-cylindrical hook 106b connected thereto and disposed on the end wall 105 side relative to the plate piece 106a, so that the plate piece 106a and the hook 106b constitute an inverted generally J-shaped hinge female section 106. The hinge female section 106 has almost the same height as the end wall 105, and an appropriate number of hinge female sections 106 are formed along the long side portion 101 (in this embodiment, four hinge female sections 106 are formed at almost equal intervals). Inside the double wall section 104, internal reinforcing ribs 107 can be formed at appropriate intervals for connecting the outer wall 104a, the inner wall 104b, and the horizontal wall 104c together.

**[0037]** A long-side locking block 108 having an outer surface 108a substantially flush with an outer surface 105a of the end wall 105 is formed in each corner formed of the end wall 105 and the horizontal wall 104c of the double wall section 104, the corner being situated between the hinge female section 106 located near each of the opposite ends of the long side portion 101 and the hinge female section 106 located closer to the center of the long side portion than the first hinge female section 106. The long-side locking block 108 comprises a notch portion 108d facing inward and having a projecting portion 108b extending upward above the end wall 105 and a placement surface 108c located at almost the same height as an upper end of the end wall 105.

**[0038]** The long side portion 101 has an end locking block 109 formed at each of the opposite ends thereof by extending the outer wall 104a and inner wall 104b of the double wall section 104 upward, the end locking block 109 being substantially as high as the long side locking block 108. The end locking block 109 has a placement surface 109a having almost the same height as the placement surface 108c of the long-side locking block 108 and a projecting portion 109b projecting up-

ward from the placement surface 109a. The projecting portion 109b comprises a projecting sub-portion 109b' extending along the long side portion 101 and a projecting sub-portion 109b'' extending perpendicularly to the projecting sub-portion 109b' in the direction of the short side portion 102, and is formed to have a generally L-shaped planar shape. The end locking block 109 has an outer surface 109c also formed to be substantially flush with the outer surface 105a of the end wall 105. 110 is a reinforcing block formed as appropriate in a corner formed of the end wall 105 and the horizontal wall 104c of the double wall section 104. An upper end of the reinforcing block 110 is aligned with the upper end of the end wall 105 but can be located therebelow as required.

**[0039]** The short side portion 102 of the bottom portion 100 is formed below the long side portion 101, and has a vertical wall 111 extending upward generally perpendicularly from the bottom plate 103 along each short side edge thereof. The bottom plate 103 has hinge female sections 106 similar to those described above, formed thereon close to the vertical wall 111 at predetermined intervals (in this embodiment, four hinge female sections 106 are formed at almost equal intervals).

**[0040]** A generally square fitting section 112 with a through-hole 112a formed therein is formed by extending upward a corresponding one of the opposite ends of the vertical wall 111 constituting the short side portion 102. The fitting section 112 is configured to be lower than the end locking block 109 formed at each of the opposite ends of the long side portion 101 and is configured so that a fitting projection formed on the short side wall 300, described later, is fitted in the through-hole 112a. A short-side locking block 113 is formed in each corner formed of the vertical wall 111 of the short side portion 102 and the bottom plate 103. The short-side locking block 113 is formed to be substantially as high as the long-side locking block 108 and end locking block 109 described above, and has a notch portion 113b facing inward and forming a placement surface 113a at almost the same height as the placement surface 108c of the long-side locking block 108 and the placement surface 109a of the end locking block 109. In addition, an outer surface 113c of the short-side locking block 113 is formed to be flush with the outer surface 111a of the vertical wall 111 constituting the short side portion 102 and is at least configured so as not to project outward beyond an outer surface 111a of the vertical wall 111.

**[0041]** 114 is a catching section formed in a middle portion of the short side portion 102 and having a recess 114c formed therein, which is formed of a pair of horizontal frames 114a, 114a arranged at a predetermined interval and of a rear frame 114b, and which is open on the outside so that jaws of an automatic machine such as a robot, an operator's fingers, or the like can be inserted into the catching section. The catching section 114 is formed by cutting the middle portion of the vertical wall 111 by a distance corresponding to the width of the

catching section 114. 115 is a recess formed in the outer wall 104a of the double wall section 104 constituting the long side portion 101 of the bottom portion 100. The recess 115 is configured so that a label, a bar code, a magnetic tape, or the like that stores various information on the folding container and articles accommodated therein such as the destination of the articles, type, and number of the articles is stuck thereto. 116 is a low reinforcing rib formed in the rear surface 103a of the bottom plate 103 to run in both vertical and lateral directions as required.

[0042] As described later, card holders are disposed on the short side walls 300 or the long side walls 200, and the recess 115 for printing and label sticking is further formed in the outer wall 104a of the double wall section 104 of the bottom portion 100, as described above, thereby allowing easy and reliable identification of various information such as the type and destination of the articles accommodated in the folding container.

[0043] Further, if the sizes of the folding containers vary, in other words, the sizes of the long side walls 200 or short side walls 300 vary, the positions of the label sticking sections or card holders provided on the long side walls 200 or the short side walls 300 may vary significantly. Despite the different sizes of the folding containers, the positions of the bottom portions 100, particularly, their heights do not vary significantly. Thus, if a read sensor of a reader disposed near a transfer device is used to read a label printed on or stuck to the recess 115 for printing or label sticking formed in the outer wall 104a of the double wall section 104 of the bottom portion 100 in the middle of being transferred to the transfer device such as a belt conveyor, it can accurately and reliably read the various information such as the type and destination of the articles accommodated in the folding container because the positions of the recesses 115 for printing and label sticking do not vary significantly despite the difference sizes of the folding containers. This configuration can prevent failures in reading arising from the different positions of the label sticking sections and eliminates the need to change the position of the read sensor of the reader depending on the size of the folding container.

[0044] Next, the long side wall 2 will be described with reference to Figures 2, 5, 6, and 8 to 10.

[0045] The long side wall 200 has a laterally elongated rectangular plate section 201 and a lower horizontal frame 202 extending outward from a lower end of the plate section 201. The lower horizontal frame 202 has hinge male sections 203 formed on a bottom surface thereof and corresponding to the hinge female sections 106 formed on the long side portion 101 side of the bottom portion 100. Each of the hinge male sections 203 comprises a pair of vertical pieces 203a suspending from the lower horizontal frame 202 perpendicularly to the plate section 201 and a horizontal pin 203b disposed between the pair of vertical pieces 203a. The vertical pieces 203a each have its lower part formed into a semi-

circular portion 203a'.

[0046] 204 is a lower block formed on a bottom surface of the lower horizontal frame 202 and comprising a pair of vertical pieces 204a similar to the above vertical pieces 203a and a connection wall 204b connecting the vertical pieces 204a together. The connection wall 204b has its lower end formed into a semicylindrical portion bent in almost the same manner as a semicircular portion 204a' of the vertical piece 204a. A lower end of the lower block 204 is aligned with a lower end of a vertical piece 203c of the hinge male section 203, and the semicircular portion 204a' of the vertical piece 204a of the lower block 204 and the semicylindrical portion of the connection wall 204b have almost the same radius as the semicircular portion 203a' of the vertical piece 203a of the hinge male section 203.

[0047] An end-wall-105-side end surface 203a" of the vertical piece 203a of the hinge male section 203 and an end-wall-105-side end surface 204a" of the vertical piece 204a of the lower block 204 recede from the lower horizontal frame 202 by a distance substantially equal to the thickness of the end wall 105. When the bottom portion 100 and the long side walls 200 are hinged using the hinge female sections 106 and hinge male sections 203 described above and the long side walls 200 are stood up perpendicularly to the bottom portion 100, the end wall 105 of the bottom portion 100 slides into a space formed due to the recession from the lower horizontal frame 202 of the vertical piece 203a of the hinge male section 203 and the vertical piece 204a of the lower block 204, so that the bottom surface of the lower horizontal frame 202 of the long side wall 200 abuts on an upper end of the end wall 105 (in particular, see Figure 14, described later). Since the bottom surface of the lower horizontal frame 202 of the long side wall 200 is configured to abut on the upper end of the end wall 105, a load imposed on the long side wall 200 from above is shared by the upper end of the end wall 105 and the bottom surface of the lower horizontal frame 202 of the long side wall 200 which are in mutual abutment, thereby precluding such a load from being effected on the hinge female sections 106 and the hinge male sections 203. This in turn prevents the hinge female sections 106 and the hinge male sections 203 from being damaged or disengaged.

[0048] The plate section 201 has a plurality of vertical ribs 205 and horizontal ribs 206 formed on an outer surface 201a thereof as appropriate. When the folding container is assembled and the long side walls 200 are stood up perpendicularly to the bottom portion 100, an inner surface 201b of the plate section 201 is substantially flush with the inner wall 104b of the double wall section 104 constituting the long side portion 101 of the bottom portion 100, an inner surface of the plate piece 106a of the hinge female section 106, and the like. When the folding container is assembled, no projecting portion is formed on a long-side-wall-200-side inner surface of the folding container. Additionally, when the folding con-

tainer is assembled, the vertical ribs 205 and the horizontal ribs 206 do not project outward beyond the outer wall 104a of the double wall section 104 constituting the long side portion 102 of the bottom portion 100.

[0049] The long side wall 200 has an engagement frame section 207 formed at each of the opposite ends thereof and extending perpendicularly to the plate section 201 toward the inner surface 201b, and the engagement frame section 207 has an upper fitting through-hole 207a formed in an upper part thereof and two through-holes 207b, 207c formed in a lower part thereof and between which a horizontal laterally elongated engagement projection 207d is provided on an inner surface 207' of the engagement frame section 207. As shown in Figure 10, a cross section of the engagement projection 207d is shaped like turned-sideways mushroom formed of a swollen portion 207d' with a tapered tip portion and of a horizontal portion 207d'' extending from the swollen portion 207d' toward an outer surface 207'' of the engagement frame section 207. Further, a fitting recess 207e is formed below the engagement projection 207d by partly notching the engagement frame section 207, and the long side wall 200, having the fitting recess 207e located therein, has a fitting through-hole 207f formed therein. In addition, a lower fitting through-hole 207g is formed below the fitting recess 207e. The upper fitting through-hole 207a, through-holes 207b, 207c, and lower fitting through-hole 207g formed in the engagement frame section 207 are formed in substantially parallel with the plate section 201, in other words, perpendicularly to the inner surface 207' and outer surface 207'' of the engagement frame section 207. In addition, the engagement frame section 207 has its bottom surface located above the lower horizontal frame 202. The fitting through-hole 207f is configured so that the short-side locking block 113 formed on the bottom portion 100 is inserted into the fitting through-hole 207f as shown in Figure 3 when the long side walls 200 are folded so as to overlap the folded short side walls 300 while the folding container is being folded.

[0050] The long side wall 200 has notch portions 209 at lower opposite ends thereof, which are each formed of a horizontal frame 208 higher than the lower horizontal frame 202 and the vertical piece 203a of the hinge male section 203. The notch portion 209 is configured so that when the long side walls 200 are attached to the bottom portion 100 and stood up perpendicularly to the bottom portion 100, the end locking blocks 109 can slide into the corresponding notch portions 209 without interfering with the long side walls 200. When a load is imposed on the long side wall 200 from above, a bottom surface 208a of the horizontal frame 208 formed at each of the lower opposite ends of the long side wall 200 comes in surface contact with the top surface 109d of the end locking block 109 formed on the bottom portion 100 to share the load on the long side wall 200. This configuration prevents the mutually coupled hinge female sections 106 and hinge male sections 203 from

being damaged by the load on the long side wall 200, as described later.

[0051] When the folding container is assembled, the upper ends of the short side walls 300 are slightly lower than the upper ends of the long side walls 200. With this configuration, if a load is imposed on the folding container from above, for example, if a large number of folding containers accommodating articles are stacked up, the long side walls 200, which can withstand loads well, come in surface contact with the bottom portion 100 to share most of the load, whereas the short side walls 300, which cannot withstand loads well, do not form such a surface contact and are not be subjected to the load.

[0052] Consequently, the load on a hinging section comprising the hinge female sections 106 and the hinge male sections 203 and hinging the bottom portion 100 to the short side walls 300 decreases to prevent damage to the hinge female sections 106 and the hinge male sections 203 hinging the bottom portion 100 to the short side walls 300.

[0053] In addition, the horizontal frame 208 has an impact wall 208b suspending from a bottom surface thereof and formed on an extension of the plate section 201. The impact wall 208b has its lower end configured to be substantially flush with a bottom surface of the lower horizontal frame 202. The impact wall 208b is configured so that when the long side wall 200 is stood up perpendicularly to the bottom portion 100, a lower end 208b' of the impact wall 208b is located close to or in abutment with the placement surface 109a of the end locking block 109 of the bottom portion 100, with the impact wall 208b coming in abutment with an inner surface of the projecting portion 109b' of the end locking block 109, the projecting portion 109b' extending along the long side portion 101 of the end locking block 109.

[0054] When the folded long side wall 200 is rotatively moved to a vertical direction of the folding container, the impact wall 208b comes in abutment with the inner surface of the projecting portion 109b' of the end locking block 109 formed on the bottom portion 100, the projecting portion 109b' extending along the long side portion 101, to hinder the long side wall 200 from rotatively moving beyond its vertical position, thereby preventing damage to the hinge section comprising the hinge female sections 106 and the hinge male sections 203. In addition, when the long side wall 200 is stood up perpendicularly to the bottom portion 100, the lower end 208b' of the impact wall 208b is located close to or in abutment with the placement surface 109a of the end locking block 109 of the bottom portion 100, thereby allowing a load imposed on the long side wall 200 from above is shared by the impact wall 208b and the end locking block 109 to prevent the hinge section from being subjected to the load and thus being damaged.

[0055] 210 is a recess having an open underside and formed by swelling the lower horizontal frame 202 upward. The recess 210 is configured so that when the bottom portion 100 is attached to the long side wall 200,

which is then stood up perpendicularly to the bottom portion 100, the long side locking blocks 108 formed on the bottom portion 100 can each slide into this recess. In this embodiment, the recess 210 is formed of the pair of vertical pieces 204a of the lower block 204 and a top portion 210a. An impact wall 210b formed on an extension of the plate section 201 is formed above the recess 210, and has a lower end configured to substantially flush with a bottom surface of the lower horizontal frame 202. When the long side wall 200 is stood up perpendicularly to the bottom portion 100, a lower end of the impact wall 210b is located close to or in abutment with the placement surfaces 108c of the long-side locking blocks 108, with the impact wall 210b coming in abutment with the projecting portions 108b of the long-side locking blocks 108.

[0056] When the folded long side wall 200 is rotatively moved in the vertical direction, the impact wall 210b comes in abutment with the projecting portions 108b of the long-side locking blocks 108 formed on the bottom portion 100 to hinder the long side wall 200 from rotatively moving beyond its vertical state, thereby preventing damage to the hinge section comprising the hinge female sections 106 and the hinge male sections 203. In addition, when the long side wall 200 is stood up perpendicularly to the bottom portion 100, a lower end of the impact wall 210b is located close to or in abutment with the placement surfaces 108c of the long-side locking blocks 108 of the bottom portion 100, thereby allowing a possible load on the long side wall 200 from above is shared by the impact wall 210b and the long-side locking blocks 108 to prevent the hinge section from being subjected to the load and thus from being damaged.

[0057] A gap is formed between each of the above described end wall 105 of the bottom portion 100 and the above described hook 106b of each hinge female section 106 formed on the bottom portion 100 and has an interval smaller than the diameter of the horizontal pin 203b of each hinge male section 203 formed on the long side wall 200.

[0058] Next, the short side wall 300 will be explained with reference to Figures 1 and 10 to 13.

[0059] Like the above described long side wall 200, the short side wall 300 has a laterally elongated rectangular plate section 301 and a lower horizontal frame 302 extending outward from a lower end of the plate section 301. The lower horizontal frame 302 has hinge male sections 303 formed on a bottom surface thereof and corresponding to the hinge female sections 106 formed on the short side portion 102 side of the bottom portion 100. Like the hinge male section 203 formed on the above described long side wall 200, each hinge male section 303 comprises a pair of vertical pieces 303a extending perpendicularly to the plate section 301 and a horizontal pin 303b disposed between the pair of vertical pieces 303a. The vertical pieces 303a each have its lower part formed into a semicircular portion 303a'.

[0060] In addition, the lower horizontal frame 302 has

a lower block 304 formed on a bottom surface thereof and which is similar to the lower block 204 formed on the long side wall 200 and which comprises a pair of vertical pieces 304a and a connection wall 304b connecting the vertical pieces 304a together. This embodiment shows an example in which the vertical pieces 304a of the lower block 304 and the vertical pieces 303a of the hinge male sections 303 are shared between the hinge male section 303 and the lower block 304 disposed adjacent to the hinge male section 303, as shown in Figure 11.

[0061] The plate section 301 has an upper horizontal frame 305 formed at an upper end thereof and opposed vertical frames 306 connecting opposite ends of the lower horizontal frame 302 to corresponding opposite ends of the upper horizontal frame 305. When the folding container is assembled and the short side walls 300 are stood up perpendicularly to the bottom portion 100, an inner surface 301a of the plate section 301 is substantially flush with the inner surface of the plate section 106a of each hinge male section 106 formed on the bottom portion 100. When the folding container is assembled, no projecting portion is formed on a short-side-wall-300-side inner surface of the folding container. Additionally, when the folding container is assembled, the lower horizontal frame 302, the upper horizontal frame 305, and the vertical frame 306, and the like do not project outward beyond the short side portion 102 of the bottom portion 100.

[0062] The short side wall 300 has vertically elongated recesses 307 each having an open underside and formed therein by folding the lower horizontal frame 302 upward. The recesses 307 are configured so that when the folding container is assembled and the short side wall 300 is stood up perpendicularly to the bottom portion 100, the short-side locking blocks 113 formed on the bottom portion 100 can slide into the corresponding recesses 307 without interfering with the short side wall 300.

[0063] An engagement frame section 308 is formed outside each of the vertical frames 306 of the short side wall 300. A plate section 308' of the engagement frame section 308 which is formed as an extension of the plate section 301 has a generally prismatic upper fitting projection 308a projecting outward and having a tapered tip and which can be fitted in the upper fitting through-hole 207a drilled in the engagement frame section 207 formed at a corresponding one of the opposite ends of the long side wall 200. In addition, a pair of locking pieces 308b extend below the upper fitting projection 308a in a generally horizontal direction and each have a locking projection 308b' in a manner such that the projections 308b' are mutually opposed. The swollen portion 207d' of each of the engagement projections 207d formed on the long side wall 200 is inserted between the pair of locking pieces 308b, and tip portions of the locking pieces 308b are inserted into the through-holes 207b, 207c drilled above and below the engagement

projection 207d. Then, the locking projections 308b' of the locking pieces 308b formed on the engagement frame section 308 of the short side wall 300 are engagingly locked on a rear surface of the swollen portion 207d' of the engagement projection 207d formed on the engagement frame section 207 of the long side wall 200.

**[0064]** Furthermore, an intermediate fitting projection 308c is formed below the locking piece 308b in a fashion extending outward and perpendicularly from the vertical frame 306 and is configured to fit in the fitting recess 207e formed in each of the engagement frame sections 207 of the long side wall 200. In addition, a flat lower engagement projection 308d is formed below the intermediate fitting recess 308c, and is configured to fit in the lower fitting through-hole 207g in each of the engagement frame sections 207 of the long side wall 200. A box-shaped lower fitting projection 308e is formed below the lower engagement projection 308d so as to be inserted into a gap D between the lower end of each engagement frame section 207 of the long side wall 200 and the upper end of the fitting section 112 formed at a corresponding one of the opposite ends of the corresponding short side portion 102 of the bottom portion 100 when the folding container is assembled. Furthermore, the engagement frame section 308 has a lower-end engagement projection 308f formed at a lower end thereof and configured to fit in the through-hole 112a in the fitting section 112 formed at each of the opposite ends of the short side portion 102 of the bottom portion 100. 309 is a hand-held opening formed above the short side wall 300 and into which the operator's fingers can be inserted.

**[0065]** A gap is formed between each of the above described vertical walls 111 of the bottom portion 100 and the above described hook 106b of each hinge female section 106 formed on the bottom portion 100 and has an interval smaller than the diameter of the horizontal pin 303b of each hinge male section 303 formed on the short side wall 300.

**[0066]** Next, how to assemble together the bottom portion 100, long side walls 200, and short side walls 300 configured as described above will be described.

**[0067]** The long side wall 200 is lowered to forcibly insert the horizontal pins 203b of the hinge male sections 203 formed on the long side wall 200 into the gap formed between the corresponding end wall 105 of the bottom portion 100 and the hooks 106b of the hinge female sections 106 formed on the bottom portion 100. Then, the plate pieces 106a of the hinge female sections 106 of the bottom portion 100 are slantly moved inward to create a gap between the end wall 105 of the bottom portion 100 and the hooks 106b of the hinge female sections 106 through which the horizontal pins 203b of the hinge male sections 203 of the long side wall 200 pass. The horizontal pins 203b are pushed downward to below the corresponding hooks 106b of the hinge female sections 106 of the bottom portion 100. Then, the plate pieces 106a of the hinge female sections 106 of the bot-

tom portion 100 return to their original positions due to their elastic force to cause the horizontal pins 203b of the hinge male sections 203 of the long side wall 200 to fit in the recesses 106b' of the hooks 106b of the hinge female sections 106 of the bottom portion 100. Thus, the hinge female sections 106 formed on the bottom portion 100 and the hinge male sections 203 formed on the long side wall 200 hinge the bottom portion 100 to the long side wall 200. Likewise, the hinge female sections 106 formed on the short-side-portion-102 side of the bottom portion 100 and the hinge male sections 303 formed on the short side wall 300 are coupled together to connect the bottom portion 100 and the short side wall 200 together.

**[0068]** When the folding container folded as shown in Figure 3 is assembled as shown in Figure 1, the long side walls 200, overlapping the bottom portion 100 and the short side walls 300, are stood up perpendicularly and the short side walls 300 are then stood up perpendicularly to assemble the folding container in the form of a box. The long side walls 200 and the short side walls 300 are configured so that each engagement frame section 207 formed on the long side wall 200 and the corresponding engagement frame section 308 formed on the short side wall 300 are mutually engaged to preclude the short side walls 300 of the assembled folding container from falling down inward easily.

**[0069]** As described above, when the short side wall 300 is rotatively moved in the vertical direction relative to the long side wall 200 stood up perpendicularly, the lower-end engagement projection 308f formed on each engagement frame section 308 of the short side wall 300 is first fitted in the through-hole 112a in the fitting section 112 formed at a corresponding one of the opposite ends of the short side portion 102 of the bottom portion 100. Then, the lower-end fitting projection 308e of the engagement frame section 308 of the short side wall 300 is inserted between the gap D formed between the lower end of each engagement frame section 207 on the long side wall 200 side and the upper end of the fitting section 112 formed at a corresponding one of the opposite ends of the short side portion 102 of the bottom portion 100. In addition, the lower engagement projection 308d of the engagement frame section 308 of the short side wall 300 is fitted in the lower fitting through-hole 207g in the engagement frame section 207 of the long side wall 200. Further, the intermediate fitting projection 308c of the engagement frame section 308 of the short side wall 300 is fitted in the fitting recess 207e of the engagement frame section 207 of the long side wall 200. Furthermore, the locking projections 308b' of the pair of locking pieces 308b of the engagement frame section 308 of the short side wall 300 are engagingly locked on the rear surface of the swollen portion 207d' of the engagement projection 207d formed on the engagement frame section 207 of the long side wall 200. Finally, the upper fitting projection 308a of the engagement frame section 308 of the short side wall 300 is fitted in the upper fitting



through-hole 207a in the engagement frame section 207 of the long side wall 200, so that the engagement frame section 207 formed in the long side wall 200 and the corresponding engagement frame section 308 formed in the short side wall 300 are mutually engaged reliably.

[0070] As described above, when the short side wall 300 is rotatively moved in the vertical direction relative to the long side wall 200 stood up perpendicularly, the lower-end engagement projection 308f formed on each engagement frame section 308 of the short side wall 300 is first fitted in the through-hole 112a in the fitting section 112 formed at a corresponding one of the opposite ends of the short side portion 102 of the bottom portion 100. Then, the flat lower engagement projection 308d of the engagement frame section 308 on the short side wall 300 side is fitted in the lower fitting through-hole 207g in the engagement frame section 207 of the long side wall 200. Consequently, the lateral (a direction in which the short side wall 300 moves in the vertical direction relative to the plate section 201 of the long side wall 200) movement of the short side wall 300 relative to the long side wall 200 is regulated to prevent the position of the engagement frame section 308 of the short side wall 300 from moving relative to the plate section 201 of the long side wall 200, thereby enabling smooth and reliable engagement between the engagement frame section 308 of the short side wall 300 and the engagement frame section 207 of the long side wall 200.

[0071] Furthermore, the engagement frame section 308 of the short side wall 300 has the generally prismatic upper fitting projection 308a having the tapered tip and configured so that in a final stage of the engagement between the engagement frame section 308 of the short side wall 300 and the engagement frame section 207 of the long side wall 200, the upper fitting projection 308a is fitted in the upper fitting through-hole 207a formed in the engagement frame section 207 on the long side wall 200 in a manner such that an outer peripheral surface of the upper fitting projection 308a is located close to an inner peripheral surface of the upper fitting through-hole 207a. Accordingly, the vertical movement of the short side wall 300 relative to the long side wall 200 and the movement of the short side wall 300 away from the long side wall 200 are regulated to preclude the long side walls 200 and the short side walls 300 from being wobbly in the assembled folding container. As a result, assembled folding containers, when piled up, are prevented from tottering and can be stably stacked up.

[0072] As described above, the lower-end engagement projection 308f of each engagement frame section 308 of the short side wall 300 is fitted in the through-hole 112a in the fitting section 112 formed at a corresponding one of the opposite ends of the short side portion 102 of the bottom portion 100, thereby allowing the bottom portion 100 and the short side walls 300 to be coupled more strongly to regulate the movement of the short side walls 300 relative to the bottom portion 100. This configuration can prevent substantial movement of

the short side wall 300 relative to the bottom portion 100, which may cause damage to the hinge female sections 106 formed on the bottom portion 100 or to the hinge male sections 303 formed on the short side wall 300, the hinge female and male sections constituting the hinging coupling the bottom portion 100 and the short side walls 300 together. In addition, the lower-end engagement projection 308f of the engagement frame section 308 of the short side wall 300 and the through-hole 112a in the fitting section 112 formed at the corresponding one of the opposite ends of the short side portion 102 of the bottom portion 100 provide a kind of positioning function to enable smooth and reliable coupling between the bottom portion 100 and the short side walls 300.

[0073] Additionally, the lower-end engagement projection 308f of the engagement frame section 308 of the short side wall 300 is fitted in the through-hole 112a in the fitting section 112 formed at the corresponding one of the opposite ends of the short side portion 102 of the bottom portion 100, thereby allowing the bottom portion 100 and the short side walls 300 to be coupled more strongly, and the long side walls 200 and the short side walls 300 are also firmly coupled together by means of a plurality of fitting means and engagement means, that is, the fitting of the lower engagement projection 308d formed on the engagement frame section 308 of the short side wall 300, in the lower fitting through-hole 207g drilled in the engagement frame section 207 of the long side wall 200, the fitting of the intermediate fitting projection 308c formed on the engagement frame section 309 of the short side wall 300, in the fitting recess 207e formed in the engagement frame section 207 of the long side wall 200, the engagingly locking of the locking projections 308b' of the pair of locking pieces 308b formed on the engagement frame section 308 of the short side wall 300, on the swollen portion 207d' of the engagement projection 207d formed on the engagement frame section 207 of the long side wall 200, and the fitting of the upper fitting projection 308a formed on the engagement frame section 308 of the short side wall 300, in the upper fitting through-hole 207a drilled in the engagement frame section 207 of the long side wall 200. As a result, the long side walls 200 and the short side walls 300 are unlikely to be mutually disengaged to improve the strength of the assembled folding container. Additionally, when a large number of assembled folding containers are piled up, the long side walls 200 and the short side walls 300 are prevented from moving to enable stable pile-up, that is, stack-up.

[0074] Furthermore, when the folding container is assembled, the lower fitting projection 308e formed on the engagement frame section 308 of the short side wall 300 is inserted, in a sandwich fashion, into the gap D between the lower end of each engagement frame section 207 of the long side wall 200 and the upper end of the fitting section 112 formed at the corresponding one of the opposite ends of the short side portion 102 of the

bottom portion 100. Consequently, even if a load is imposed on the short side wall 300 of the assembled folding container from above, it is shared by the lower fitting projection 308e of the short side wall 300, which is placed at the upper end of the fitting section 112 formed at the corresponding one of the opposite ends of the short side portion 102 of the bottom portion 100. Therefore, the hinging coupling the bottom portion 100 and the short side walls 300 together is not subjected to the load, thereby preventing damage to the hinge female sections 106 formed on the bottom portion 100 and to the hinge male sections 303 formed on the short side wall 300.

[0075] In addition, the engagement frame section 308 of the short side wall 300 has the pair of locking pieces 308b each extending substantially in the horizontal direction and having the locking projection 308b' at its tip, and the pair of locking pieces 308b engagingly lock the rear surface of the swollen portion 207d' of the engagement projection 207d formed on the engagement frame section 207 on the long side wall 200 side. Accordingly, even if the long side wall 200 or the short side wall 300 wobbles in the vertical direction, since one of the locking pieces 308b is locked on the engagement projection 207d, the locking pieces 308b and the engagement projection 207d are not mutually unlocked. Additionally, even if the long side wall 200 or the short side wall 300 moves in the horizontal direction, the locking pieces 308b are not disengaged from the engagement projection 207d because they are laterally elongated so as to extend in the horizontal direction, resulting in a firm engagement between the engagement frame section 207 of the long side wall 200 and the engagement frame section 308 of the short side wall 300. Furthermore, the intermediate fitting projection 308c formed on the engagement frame section 308 of the short side wall 300 is fitted in the fitting recess 207e formed in the engagement frame section 207 of the long side wall 200. This configuration restrains wobbling and relative movement between the long side wall 200 and the short side wall 300, thereby more reliably preventing disengagement between the locking pieces 308b and the engagement projection 207d.

[0076] As described above, when the folding container is assembled, each long-side locking block 108 formed on the bottom portion 100 slides into the corresponding recess 210 having the open underside and formed in the lower horizontal frame 202 of the long side wall 200, and each short-side locking block 113 formed on the bottom portion 100 slides into the corresponding vertically elongated recess 307 formed in the short side wall 300. In this manner, when the folding container is assembled, the long-side locking blocks 108 and short-side locking blocks 113 formed on the bottom portion 100 do not abut on the long side wall 200 and the short side wall 300, respectively. In addition, when the folding container is assembled, each end locking block 109 formed on the bottom portion 100 can slide into the

notch 209 without interfering with the long side wall 200, the notch 209 being located at the corresponding one of the lower opposite ends of the long side wall 200 and formed of the horizontal frame 208 higher than the lower horizontal frame 202 and the vertical piece 203a of the corresponding hinge male section 203.

[0077] As described above, the outer surface 108a of each long-side locking block 108, the outer surface 113c of each short-side locking block 113, and the outer surface 109c of each end locking block 109, which are all formed on the bottom portion 100, are configured so as not to project outward beyond the corresponding long side portion 101 and short side portion 102 of the bottom portion 100. Additionally, the long side wall 200 and the short side wall 300 are configured so as not to project outward beyond the corresponding long side portion 101 and short side portion 102 of the bottom portion 100. Furthermore, the outer surfaces of the bottom portion 100, long side walls 200, and short side walls 300 are configured to be substantially mutually flush. Consequently, even when two assembled folding containers are arranged in juxtaposition in a manner such that the long side wall 200 or short side wall 300 of one of the folding containers are brought in abutment with the corresponding long side wall 200 or short side wall 300 of the other, substantially no gap is formed between the adjacent folding containers, thereby allowing the assembled folding containers to be stored more efficiently. In addition, since no fitting shoulder section is formed as in the conventional folding containers, the folding container according to the present invention, when assembled, has a large internal volume compared to its outside dimensions, and thus has an improved accommodation efficiency.

[0078] If the folding container assembled as shown in Figure 1 is folded as shown in Figure 3, the short side walls 300 are rotatively moved toward the bottom portion 100 to disengage the engagement frame sections 207 of the long side walls 200 from the engagement frame sections 308 of the short side walls 300 to place the short side walls 300 on the bottom portion 100. Then, the long side walls 200 are brought down and placed on the folded short side walls 300, and in this case, since the short-side locking blocks 113 formed on the bottom portion 100 have slid into the corresponding fitting recesses 207e formed in the engagement frame section 207 of the long side wall 200 and then into the corresponding fitting through-holes 207f drilled in the long side wall 200, the short-side locking blocks 113 formed on the bottom portion 100 do not obstruct the folding of the long side walls 200. In this manner, the folding container is folded. Then, the long-side locking blocks 108, end locking blocks 109, and short-side locking blocks 113 formed on the bottom portion 100 project upward above the long side walls 200 of the folded folding container.

[0079] In addition, since the short-side locking blocks 113 are each configured to be inserted into the corre-

sponding fitting through-hole 207f drilled in the long side wall 200, even if an external or internal force is applied to the short-side locking block 113, the fitting through-hole 207f serves to prevent the short-side locking block 113 from being shifted or damaged, thereby enabling folded folding containers to be stably stacked up. In this manner, the folding container is folded. Preferably, a trumpet-shaped inclined surface 207e' is formed at a tip portion of the fitting recess 207e so that the short-side locking block 113, when inserted into the fitting through-hole 207, does not abut on portions of the engagement frame section 207 above and below the fitting recess 207e. Additionally, the inclined surface 207e' works as a guide surface when the short-side locking block 113 is inserted into the fitting through-hole 207f.

**[0080]** When folding containers folded as shown in Figure 3 are stacked up, the bottom fitting section 100a formed of the inner wall 104b and the like of the bottom section 100 of the upper folding container is fitted on the notches 108d in the long-side locking blocks 108, the notches 113b in the short-side locking blocks 113, and the projecting portions 109b of the end locking blocks 109, which are all formed on the bottom portion 100 of the lower folding container, and the bottom fitting section 100a is placed on the placement surfaces 108c of the long-side locking blocks 108, the placement surfaces 113a of the short-side locking blocks 113, and the placement surfaces 109a of the end locking blocks 109. Consequently, the upper folding container is prevented from moving in the horizontal direction by means of the long-side locking blocks 108, short-side locking blocks 113, and end locking blocks 109 of the lower folding container, thereby enabling a large number of folded folding containers to be stably stacked up.

**[0081]** The arrangement, number, and the like of the long-side locking blocks 108, end locking blocks 109, and short-side locking blocks 113 formed on the bottom portion 100 in the above described embodiment are not limited to those in this embodiment.

**[0082]** In addition, if the bottom portion 100 has the long-side locking blocks 108 and the short-side locking blocks 113 formed thereon and when the folded folding containers are stacked up, the bottom fitting section 100a of the bottom portion 100 of the upper folding container is fitted on the notches 108d in the long-side locking blocks 108 and the notches 113b in the short-side locking blocks 113, which are all formed on the bottom portion 100 of the lower folding container, thereby hindering the upper folding container from moving in the horizontal direction. Accordingly, the end locking blocks 109 can be omitted.

**[0083]** Furthermore, since the end locking blocks 109 each have the projecting portion 109b having a generally L-shaped planar shape and comprising the projecting sub-portion 109b' extending along the long side portion 101 and the projecting sub-portion 109b'' extending perpendicularly to the long side portion 101, folded folding containers can also be stably stacked up by using

only the end locking blocks 109 without forming the long-side locking blocks 108 or the short-side locking blocks 113.

**[0084]** Next, the hinge male sections 203 formed on each long side wall 200 and the hinge female sections 106 formed on each long side portion 101 of the bottom portion 100, which are all shown as examples of components constituting the hinging, will be described in detail with reference to Figures 14 and 15.

**[0085]** This embodiment substantially eliminates the gap as conventionally formed between the lower end of the vertical piece 203a of each hinge male section 203 disposed on the long side wall 200 and the top surface of the horizontal wall 104c of the corresponding double wall section 104 of the bottom portion 100.

**[0086]** Thus, when the folding container is assembled, a radius  $r1$  located in a corner A formed of an inner surface 105b of each end wall 105 of the bottom portion 100 and of the horizontal wall 104c of each double wall 104 of the bottom portion 100, the radius covering almost a quarter of the vertical piece 203a of each hinge male section 203 disposed on the long side wall 200, a distance  $d1$  between a central point  $c1$  of the horizontal pin 203b of the hinge male section 203 and the inner surface 105b of the end wall 105, and a distance  $d2$  between the central point  $c1$  of the horizontal pin 203b and the top surface of the horizontal wall 104c of the double wall section 104 are almost equal, and a distance  $d3$  between the central point  $c1$  of the horizontal pin 203b and the inner surface 201b of each plate section 201 of the long side wall 200 and a distance  $d2$  between the central point  $c1$  of the horizontal pin 203b and the top surface of the horizontal wall 104c of the double wall section 104 are almost equal. To achieve this configuration, the central point  $c1$  of the horizontal pin 203b of the hinge male section 203 formed on the long side wall 200 is offset, by a predetermined amount  $d4$ , from a thickness-wise center line  $L1$  of the long side wall 200 toward the inner surface 201b of the plate section 201 of the long side wall 200, that is, in the direction in which the long side wall 200 is rotated.

**[0087]** In short, the distance  $d1$  between the central point  $c1$  of the horizontal pin 203b of the hinge male section 203 formed on the long side wall 200 and the inner surface 105b of the end wall 105 of the bottom portion 100, the distance  $d2$  between the central point  $c1$  of the horizontal pin 203b and the top surface of the horizontal wall 104c of the double wall section 104 of the bottom portion 100, and the distance  $d3$  between the central point  $c1$  of the horizontal pin 203b and the inner surface 201b of the plate section 201 of the long side wall 200 are all almost equal to the radius  $r1$  of the generally semicircular portion 203a' in the lower part of the vertical piece 203a constituting the hinge male section 203 formed on the long side wall 200. This configuration substantially eliminates the gap between the lower end of the vertical piece 203a of the hinge male section 203 formed on the long side wall 200 and the top surface of

the horizontal wall 104c of the double wall section 104 of the bottom portion 100 to prevent foreign matter from entering this gap while enabling the long side wall 200 to be brought down to its substantially horizontal position in folding the folding container.

**[0088]** With this configuration, when the folding container is assembled as shown in Figure 1, substantially no gap is formed between the lower end of the vertical piece 203a of the hinge male section 203 formed on the long side wall 200 and the top surface of the horizontal wall 104c of the double wall section 104 of the bottom portion 100 to prevent foreign matter such as articles accommodated in the folding container or dust from entering this gap.

**[0089]** In addition, the distance d3 between the central point c1 of the horizontal pin 203b and the inner surface 201b of the plate section 201 of the long side wall 200 is almost equal to the distance d2 between the central point c1 of the horizontal pin 203b and the top surface of the horizontal wall 104c of the double wall section 104 of the bottom portion 100, so that when the folding container is folded as shown in Figure 2, the long side walls 200 can be brought down to their substantially horizontal positions and are thus prevented from inclining upward relative to the central point c1 of the horizontal pin 203b, thereby enabling the folding container to be folded thin.

**[0090]** In addition, the hook 106b of each hinge female section 106 has an inclined surface 106c formed on an upper outer peripheral surface thereof and inclining upward from the corresponding end wall 105 of the bottom portion 100 toward the plate piece 106a of the hinge female section 106. To hinge the bottom portion 100 to the long side wall 200, the inclined surface 106c has such a width that when the long side wall 200 is lowered, the horizontal pin 203b of each hinge male section 203 formed on the long side wall 200 is placed on the inclined surface 106c as shown in Figure 15.

**[0091]** To hinge the bottom portion 100 to the long side wall 200, the long side wall 200 is first lowered so that the horizontal pin 203b of each hinge male section 203 formed on the long side wall 200 comes in abutment with the inclined surface 106c of the hook 106b of the corresponding hinge female section 106 formed on the bottom portion 100, as shown in Figure 15. Subsequently, when the long side wall 200 is further lowered, the horizontal pin 203b moves along the inclined surface 106c of the hook 106b toward the end wall 105. After the horizontal pin 203b of the hinge male section 203 formed on the long side wall 200 has come in abutment with the end wall 105 and when the long side wall 200 is further lowered, the hinge female section 106 slantly moves to the right in Figure 15 against its own elastic force to form a gap between the end wall 105 and the tip of the hook 106b through which the horizontal pin 203b can pass. Once the horizontal pin 203b has moved downward below the tip of the hook 106b of the hinge female section 106 after passing through the above gap, the hinge female section 106 returns to its original position due to

its elastic force, and the horizontal pin 203b of the hinge male section 203 is fitted in the recess 106b' of the hook 106b of the hinge female section 106, thereby hinging the bottom portion 100 to the long side wall 200 via the hinge section comprising the hinge female sections 106 and the hinge male sections 203.

**[0092]** As described above, the hook 106b of each hinge female section 106 has the inclined surface 106c formed on the upper outer peripheral surface thereof and inclining downward to the corresponding end wall 105 of the bottom portion 100 so that when the long side wall 200 is lowered, the horizontal pin 203b of the corresponding hinge male section 203 formed on the long side wall 200 is placed on the inclined surface 106c, whereby the horizontal pin 203b of the hinge male section 203 formed on the long side wall 200 is prevented from moving toward the plate piece 106a of the hinge female section 106 formed on the bottom portion 100. Consequently, the horizontal pin of the hinge male section is not fitted in the recess in the hook of the hinge female section as in the prior art, thereby preventing failures to hinge the bottom portion to the long side wall.

**[0093]** Next, a card holder 400 molded integrally with the long side wall 200 will be explained by way of example with reference to Figures 8 and 16 to 19.

**[0094]** The card holder 400 is constructed by juxtaposing two or more card holder members 400a each formed of a card presser piece 401 and the like, described below. One of the card holder members 400a constituting the card holder 400 will be described below.

**[0095]** The card presser piece 401 constituting the card holder member 400a is connected to a thin connection section 402 connected to a lower end of a connection wall 204b formed between the vertical piece 203a of the hinge male section 203 formed on the bottom surface of the lower horizontal frame 202 of the long side wall 200 and the vertical piece 204a of the lower block 204. The card presser piece 401 is formed into an elongated band.

**[0096]** When the card holder member 400a is molded integrally with the long side wall 200, the card presser piece 401 suspends generally downward perpendicularly from the lower end of the long side wall 200 via the thin connection section 402, as shown in Figures 16 and 19. The card presser piece 401 has a first fitting hole 403 drilled near the thin connection section 402 and a second fitting hole 404 drilled further from the thin connection section 402 than the first fitting hole 403. In addition, an engagement projection 405 is formed between the first fitting hole 403 and the second fitting hole 404 in the card presser piece 401 so as to extend away from the outer surface 201a of the plate section 201 of the long side wall 200.

**[0097]** 211 is a pair of regulation blocks disposed on the lower horizontal frame 202 of the long side wall 200 so as to have an internal width w2 slightly larger than the width w1 of the card presser piece 401. The regulation block 211 has a depth x1 formed to be almost the

same as the depth x2 of the lower horizontal frame 202 of the long side wall 200. Additionally, the regulation blocks 211 are connected together by a connection block 212 integrated with the plate section 201 of the long side wall 200.

[0098] The connection block 212 has a locking piece 213 formed in a substantially central portion in its upper part so as to extend in the horizontal direction away from the outer surface 201a of the plate section 201 of the long side wall 200, and the locking piece 213 has a locking projection 213a formed on a bottom surface thereof at its tip so as to extend downward. A guide block 214 is formed below the locking piece 213 and extends in the same direction as the locking piece 213 substantially parallel therewith. 215 is a through-hole formed between the locking piece 213 and the guide block 214 by means of a molding member for molding the card holder member 400a integrally with the long side wall 200.

[0099] As described above, when the card holder member 400a is molded integrally with the long side wall 200, the card presser piece 401 suspends generally downward perpendicularly from the lower end of the long side wall 200 via the thin connection section 402. When, however, the card presser piece 401 is then rotatively moved toward the outer surface 201a of the plate section 201 of the long side wall 200 in a fashion folding the thin connection section 402, the guide block 214 formed on the long side wall 200 is first fitted in the first fitting hole 403 formed in the card presser piece 401. When the card presser piece 401 is continuously rotatively moved toward the outer surface 201a of the plate section 201 of the long side wall 200, the engagement projection 405 formed on the card presser piece 401 is pushed into the gap between the guide block 214 and the locking piece 213 formed on the long side wall 200, and is then passed therethrough while elastically deforming the locking piece 213 upward to extend the gap between the guide block 214 and the locking piece 213. [0100] After the engagement projection 405 formed on the card presser piece 401 has passed through the gap between the guide block 214 and the locking piece 213 formed on the long side wall 200, the locking piece 213 is rotatively moved downward due to its own elasticity and its locking projection 213a is engagingly locked on an upper corner 405a at a tip of the engagement projection 405, so that the card presser piece 401 is engaged with and held in the locking piece 213 formed on the long side wall 200.

[0101] Additionally, the card presser piece 401 is formed of a base 401a located on the thin connection section 402 side and having the first fitting hole 403, the second fitting hole 404, and the engagement projection 405 formed therein; an intermediate portion 401b connected to the base 401a and inclined outward; and a card guide section 401c formed by bending a tip of the intermediate portion 401b outward. Once the upper corner 405a at the tip of the engagement projection 405 formed on the card presser piece 401 has been engag-

ingly locked in the locking projection 213a of the locking piece 213 formed on the long side wall 200 to assemble the card holder member 400a, a bent portion 401d located at the boundary line between the intermediate portion 401b of the card presser piece 401 and the card guide section 401c comes in abutment with the outer surface 201a of the plate section 201 of the long side wall 200. Additionally, a wedge-shaped space 406 is formed between an inner surface 401c' of the card guide section 401c located above the bent portion 401d and the outer surface 201a of the plate section 201 of the long side wall 200 in a manner such that the interval between the inner surface 401c' of the card guide section 401c and the outer surface 201a of the plate section 201 of the long side wall 200 decreases linearly with height.

[0102] By assembling two or more card holder members 400a as described above, the card holder 400 is formed. To allow the card holder 400 formed in this manner to hold a card 407, a lower side 407a of the card 407 is inserted into the above described wedge-shaped space 406 and the card 407 is then pushed downward. The card 407 moves the bent portion 401d of the card presser piece 401, with which the outer surface 201a of the plate section 201 of the long side wall 200 is in abutment, away from the outer surface 201a of the plate section 201 of the long side wall 200, to form a gap between the outer surface 201a of the plate section 201 of the long side wall 200 and the bent portion 401d of the card presser piece 401 through which the card 407 can pass. Thus, the card 407 is further pushed downward until it has passed through the gap, followed by the abutment of its lower side 407a on the top surface of the regulation block 211 or connection block 212. In this manner, the card 407 is held by two or more card holder members 400a. The card 407 held by the two or more card holder members 400a is brought into pressure contact with the outer surface 201a of the plate section 201 of the long side wall 200 by means of the bent portion 401d of the card presser piece 401, thereby hindering the card 407 from being moved or disengaged from the container card holder 400 easily.

[0103] The above described card holder member 400a is molded integrally with the long side wall 200, but if the long side wall 200 is molded of an opaque resin, the card holder member 400a is also molded of a similar opaque resin, thereby causing the card 407 held in the card holder member 400a to be partly concealed by the card holder member 400a. This, to solve such a problem, the card presser piece 401 constituting the card holder member 400a is formed into an elongated band.

[0104] In addition, by injecting a transparent or translucent resin into a molding space for molding the card presser piece 401 of the card holder member 400a, while injecting an appropriate colored resin into a molding space for molding the long side wall 200, the transparent or translucent card holder member 400a and the colored long side wall 200 can be integrally molded.

[0105] According to the present invention, as de-

scribed above, the card presser piece 401 constituting the card holder member 400a is molded integrally with the long side wall 200 via the thin connection section 402, so that the card holder can be easily assembled simply by rotatively moving the card presser piece 401 toward the outer surface 201a of the plate section 201 of the long side wall 200 in a fashion folding the thin connection section 402.

[0106] Additionally, since the card presser piece 401 constituting the card holder member 400a is formed into an elongated band, only a small part of the card 407 is concealed by the card presser piece 401, thereby allowing easy reading of the destination, name, type, quantity, and the like of articles described or stored in the card 407.

[0107] Since the card 407 held in the two or more card holder members 400a is brought into pressure contact with the outer surface 201a of the plate section 201 of the long side wall 200 by means of the bent portion 401d of the card presser piece 401, the card 407 is prevented from being moved or disengaged from the card holder 400 easily.

[0108] The assembled card presser piece 401 is located between the piece of regulation blocks 211 formed on the long side wall 200, so that even if an external force is applied to the card presser piece 401 to move it along the outer surface 201a of the plate section 201 of the long side wall 200, the regulation blocks 211 restrains this movement to prevent the thin connection section 402, which is relatively fragile, from being damaged, while preventing the card 407 held in the card holder members 400a from being disengaged when the card presser piece 401 is moved.

[0109] In addition, each long side wall 200 has a notch 216 formed therein by notching the inside of the upper end thereof, and each short side wall 300 has a notch 310 formed therein by notching the inside of the upper end thereof. These notches 216, 310 are configured so that when assembled folding containers are stacked up, the bottom fitting section 100a of the bottom portion 100 of the upper folding container is fitted in these notches.

[0110] The bottom portion 100, long side walls 200, and short side walls 300 constituting the above described folding container are each molded of a synthetic resin by means of injection molding or the like and then hinged together as described above to assemble the folding container.

[0111] Due to the above described configuration, the present invention has the following effects.

[0112] The bottom portion of the folding container has formed thereon the locking blocks on which the bottom portion of another folded folding container can be fitted, and the side walls of the folding container has the recesses formed therein and each having the open underside into which the corresponding locking block of the assembled folding container can be inserted, thereby enabling folded folding containers to be stably stacked up. In addition, the engagement frame sections are used

to mutually engage the side walls and to engage the side walls with the bottom portion, thereby allowing the folding container to be firmly assembled in the form of a box.

[0113] Since one of the opposed side walls has the through-holes drilled therein and into which the corresponding locking blocks, which project upward, can be inserted upon folding, the locking blocks do not obstruct folding of the folding container.

[0114] The engagement projections formed on the engagement frame section of each of the side walls are fitted in the corresponding through-holes formed in the bottom portion. Accordingly, when the folding container is assembled in the form of a box, the bottom portion and the side walls can be coupled together more strongly to regulate the movement of the side walls relative to the bottom portion, thereby preventing substantial movement of the side walls relative to the bottom portion, which may damage the hinge section coupling the bottom portion and the side walls together.

[0115] When the side walls are stood up perpendicularly to the bottom portion, the bottom surfaces of the side walls and the top surface of the bottom portion partly come in surface contact with one another. As a result, a load imposed on the side wall can be shared by this surface contact section to prevent the load on the side wall from damaging the hinge section.

[0116] Since the card presser pieces each constituting the card holder are integrated with the side wall via the thin connection section, the card holder can be easily assembled simply by rotatively moving the card presser piece toward the side wall in a fashion folding the thin connection section.

## Claims

1. A folding container comprising side walls disposed in a fashion surrounding a bottom portion thereof and which can be folded so as to overlap the bottom portion, the side walls each having engagement frame sections formed thereon for mutually engaging the adjacent side walls so that when stood up perpendicularly to the bottom portion, the side walls will not fall down inward, characterized in that the bottom portion has locking blocks formed thereon and on which the bottom portion of a folded folding container can be fitted, the side walls each have recesses formed therein and each having an open underside into which the corresponding engagement block of an assembled folding container can be inserted, and the engagement frame sections are used to mutually engage the side walls and to engage the side walls with the bottom portion.
2. A folding container according to Claim 1, characterized in that one of the opposed side walls has through-holes into which the corresponding locking blocks, which project upward, can be inserted upon

folding.

3. A folding container according to Claim 1 or Claim 2, characterized in that engagement projections formed on the engagement frame sections of each side wall are configured to fit in corresponding through-holes in each fitting section formed in the bottom portion. 5
4. A folding container according to any one of Claim 1 to Claim 3, characterized in that when the side walls are stood up perpendicularly to the bottom portion, a bottom surface of each side wall partly comes in surface contact with a top surface of the bottom portion. 10 15
5. A folding container according to any one of Claim 1 to Claim 4, characterized in that card presser pieces each constituting a card holder are integrated with the side wall via a thin connection section. 20

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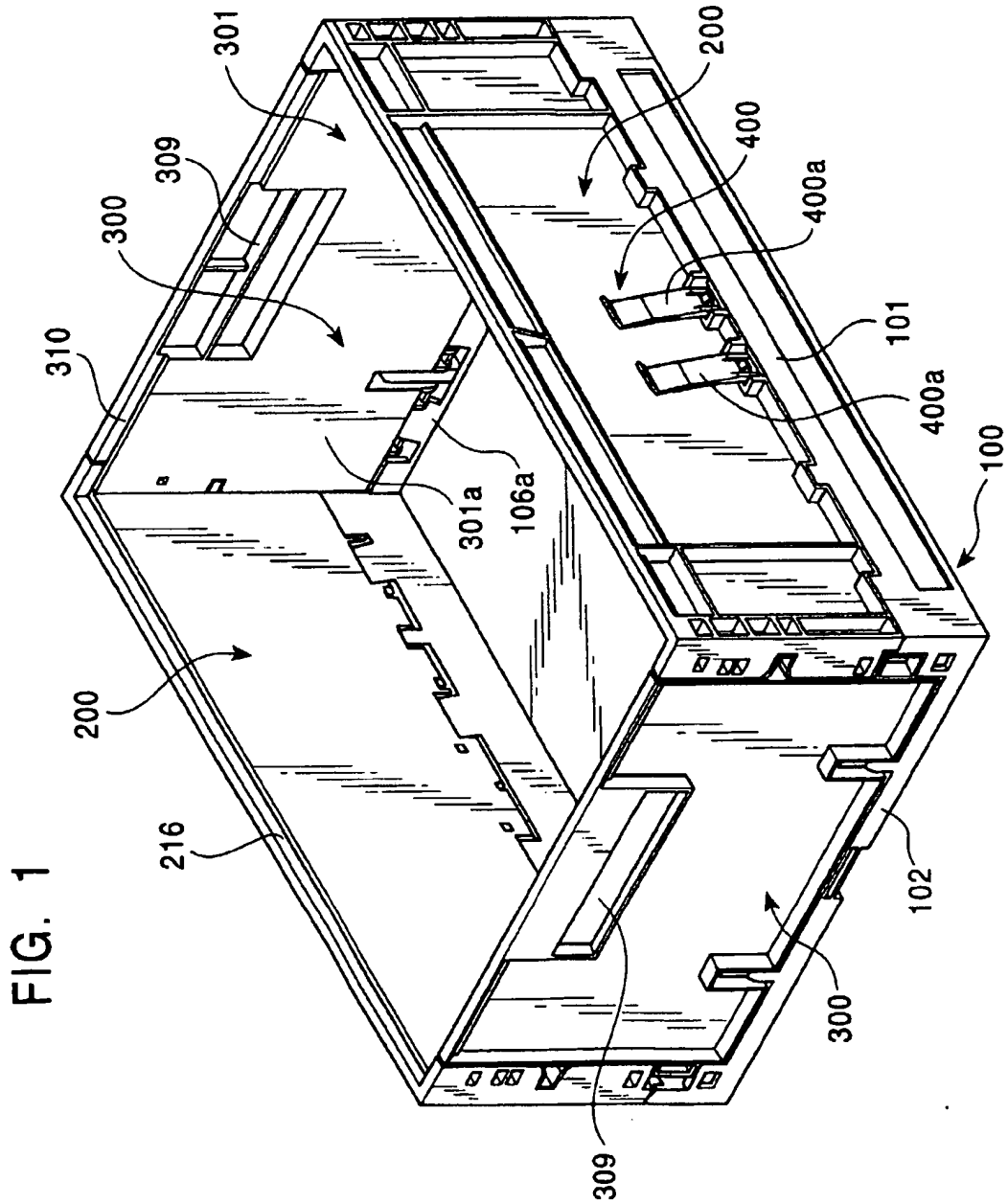
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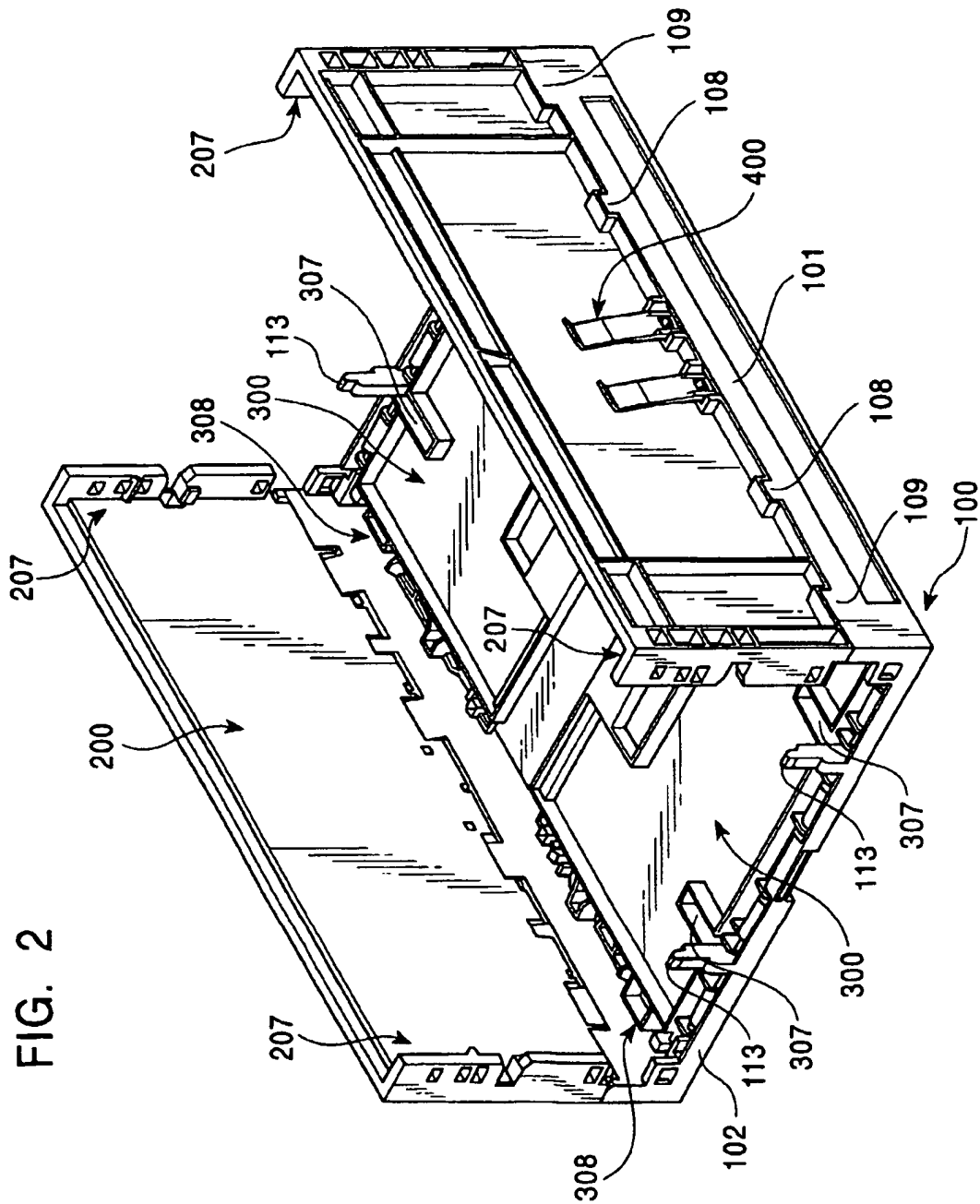
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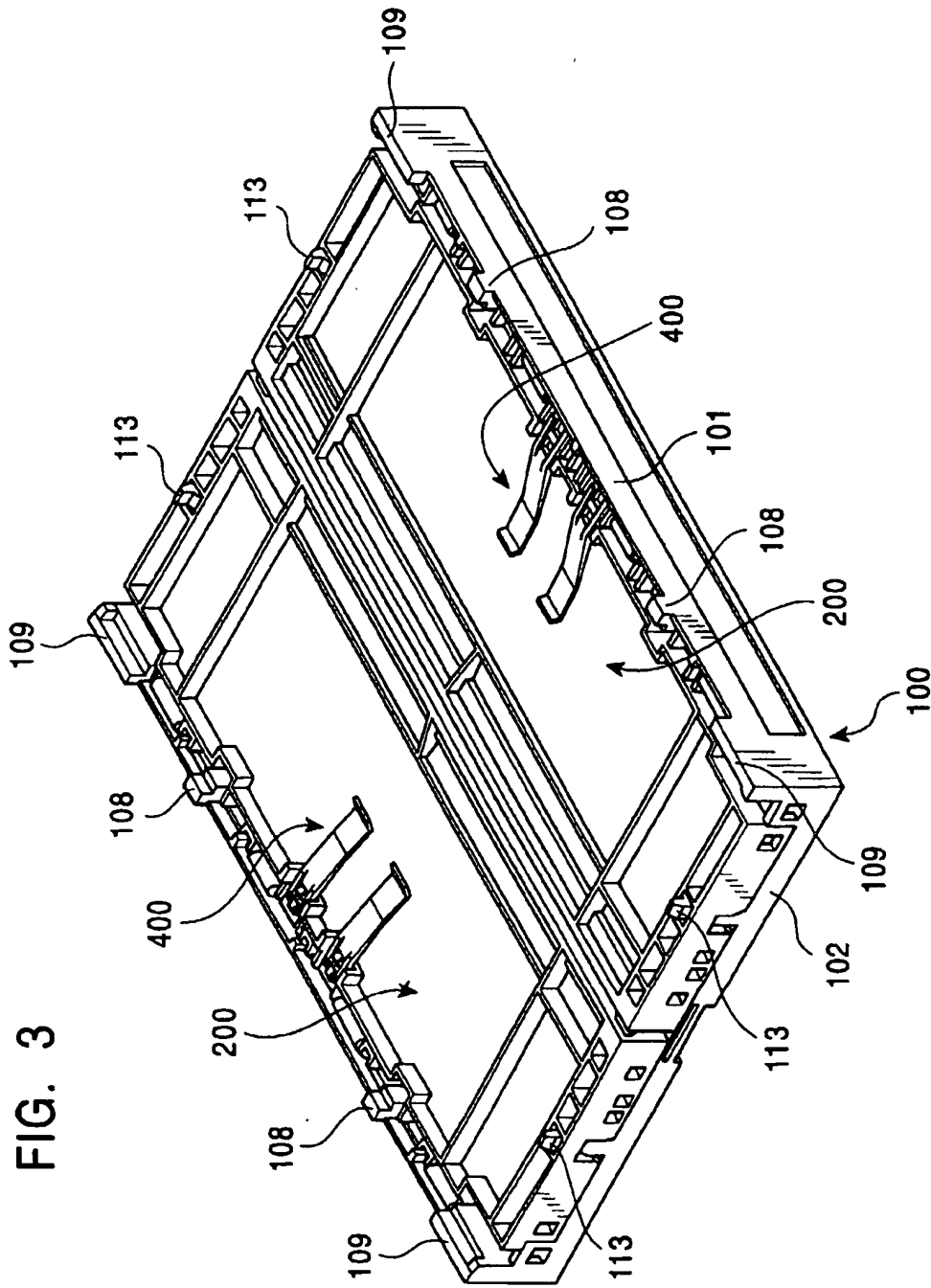


FIG. 3

FIG. 4

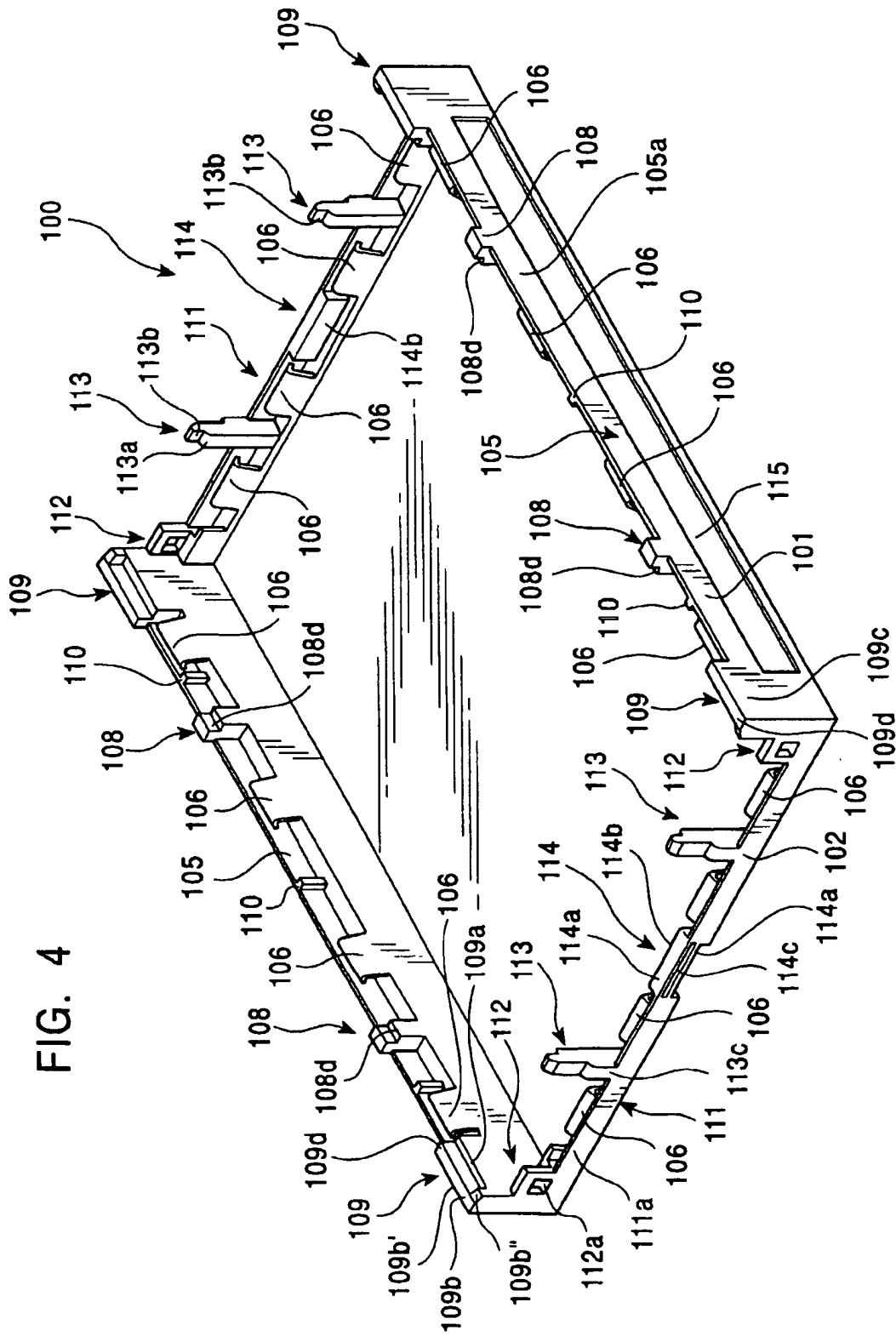


FIG. 5

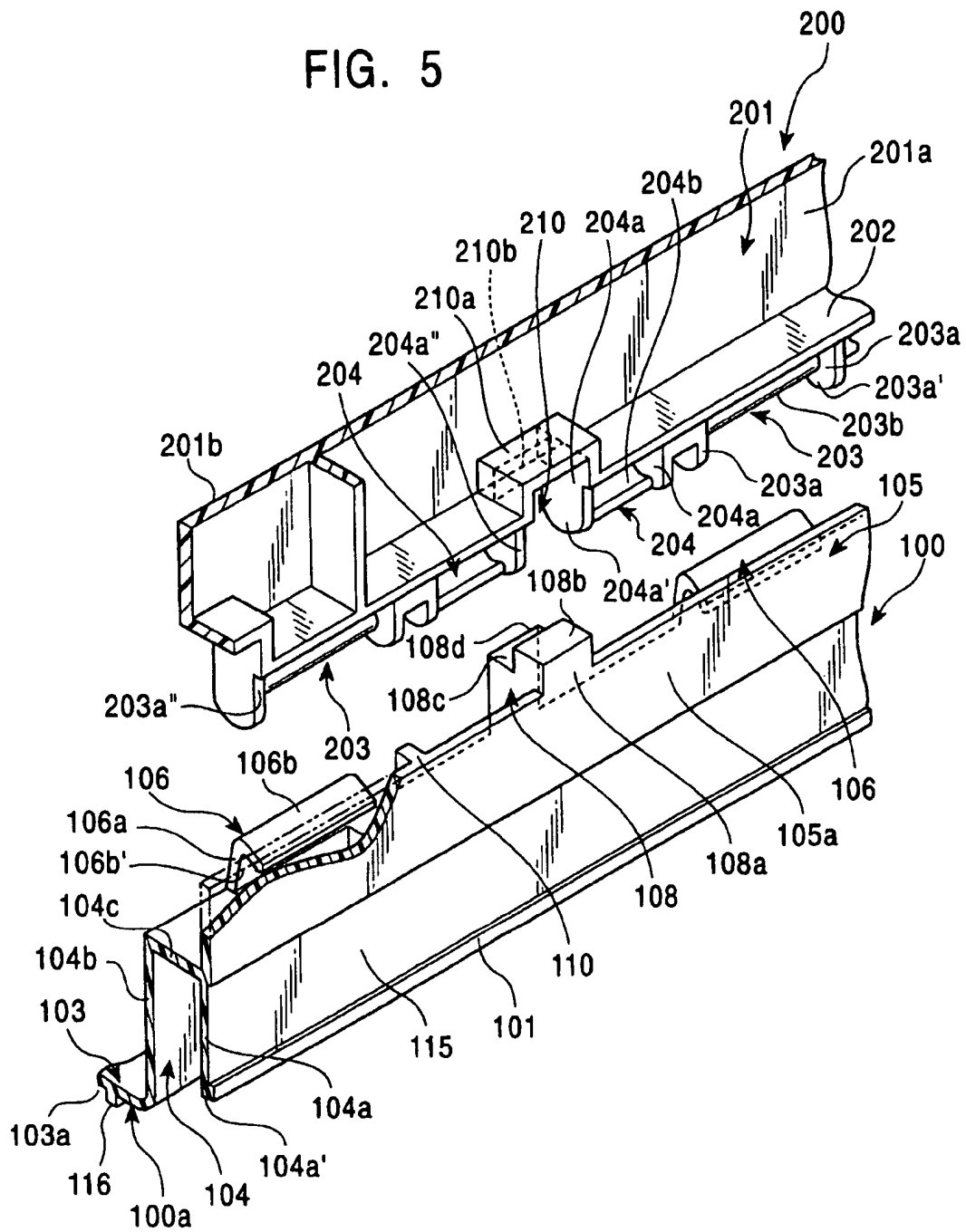
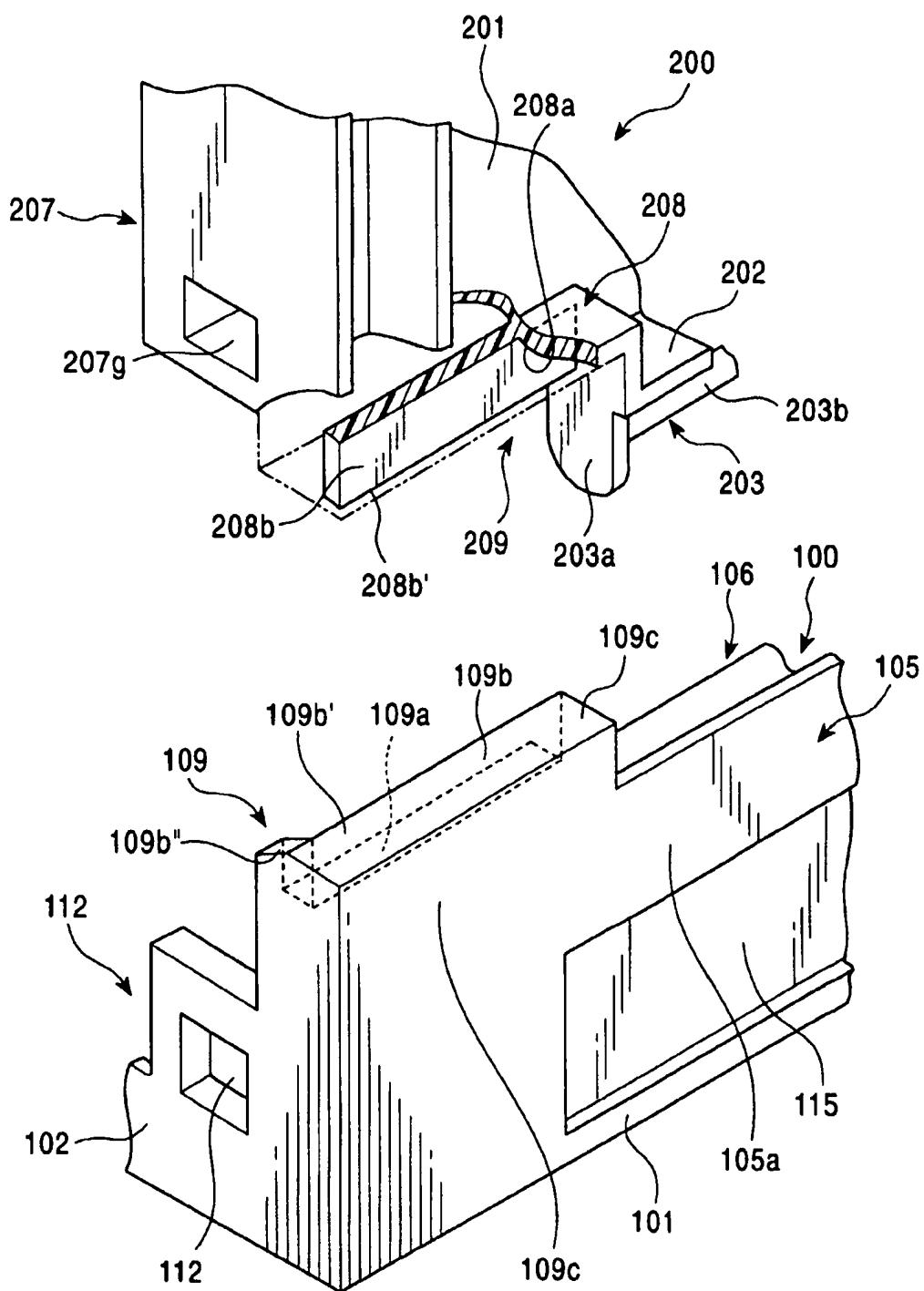
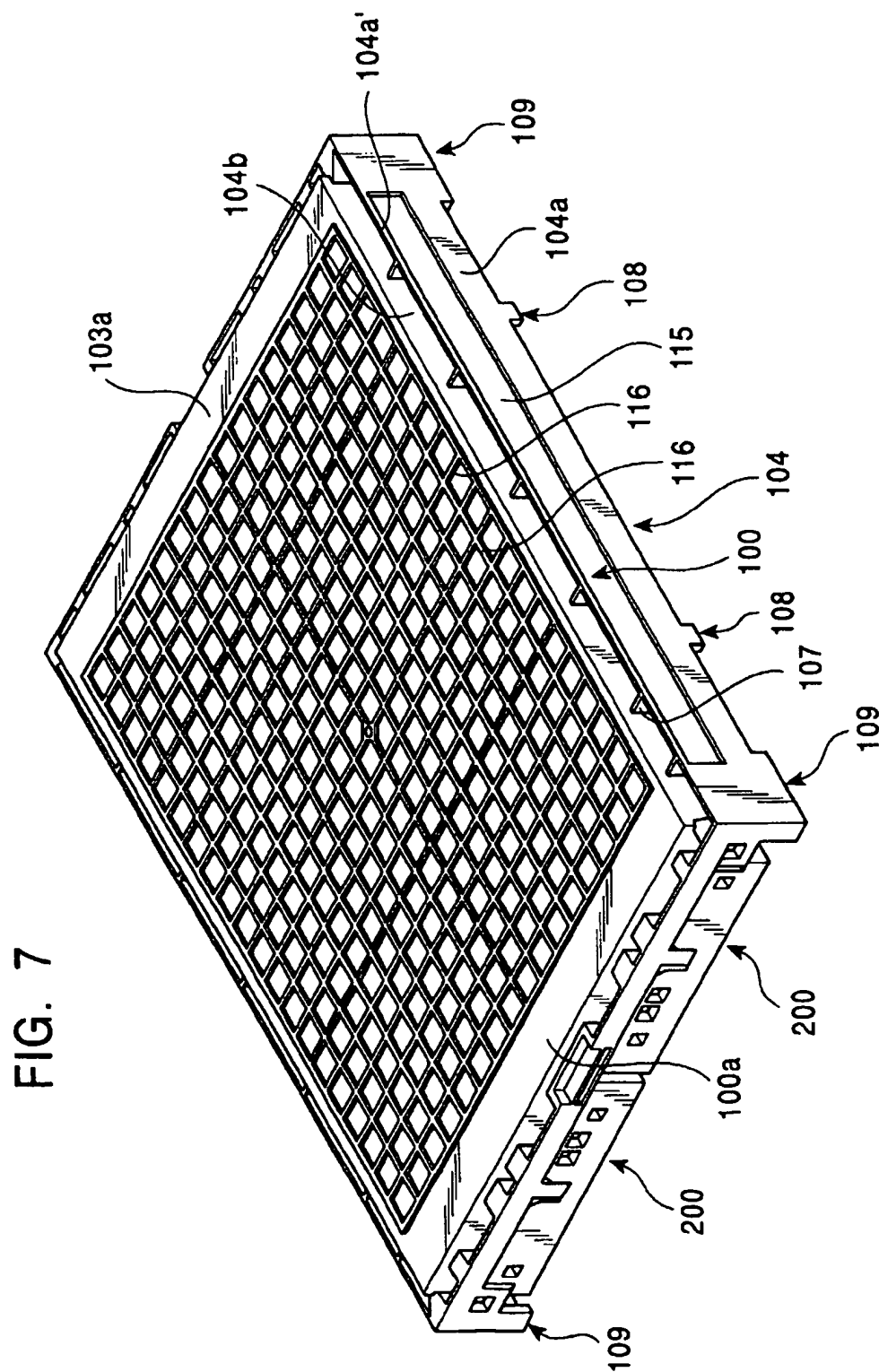


FIG. 6





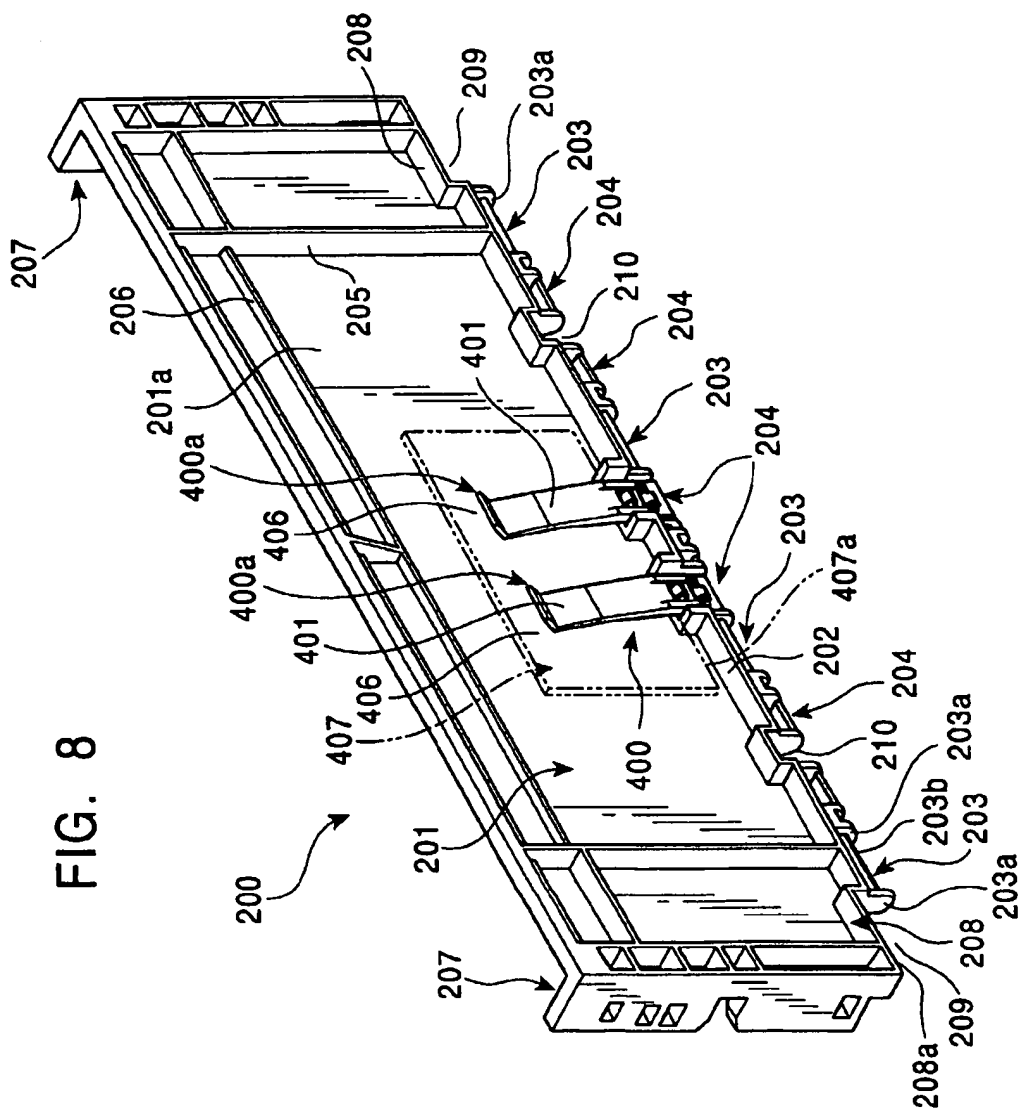


FIG. 9

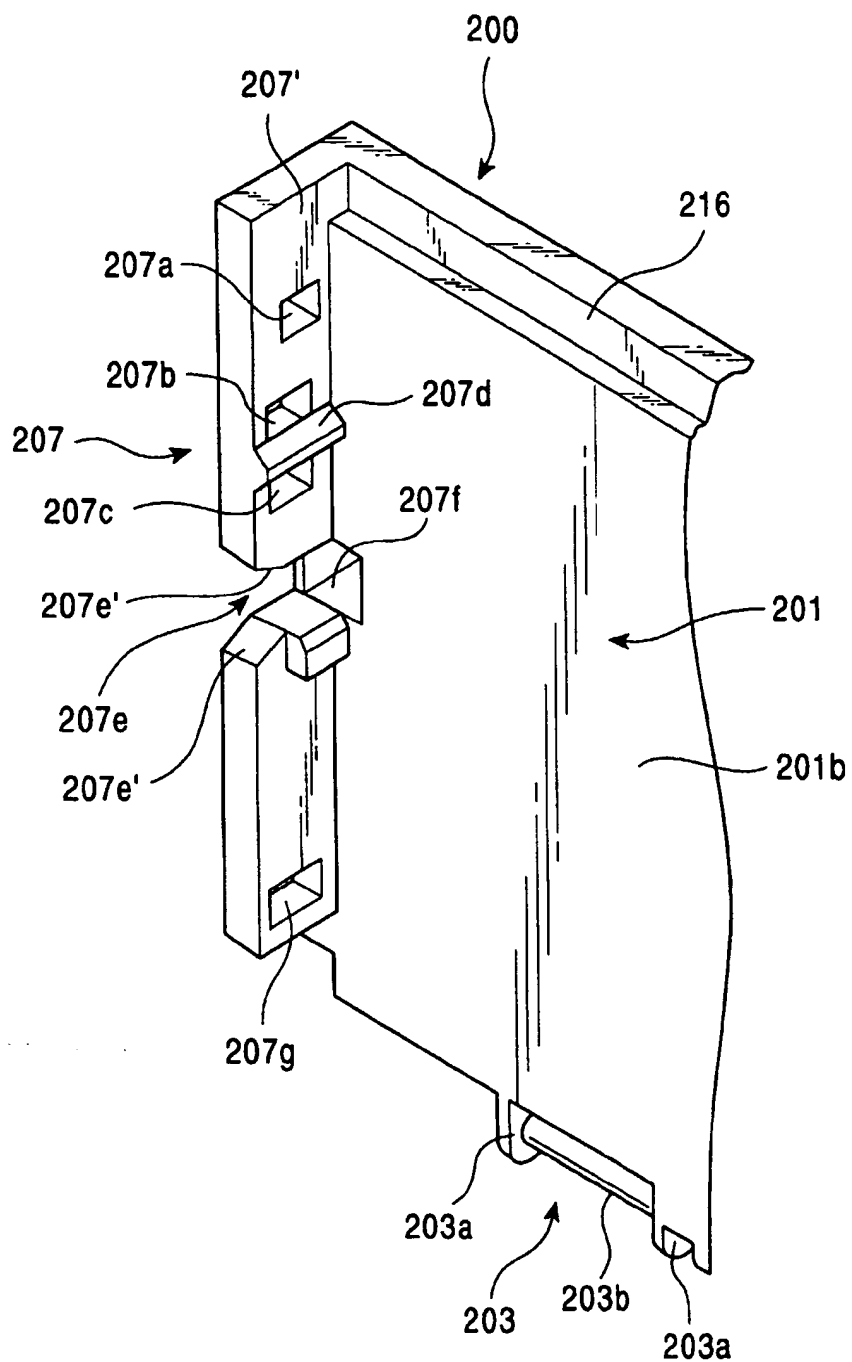




FIG. 10

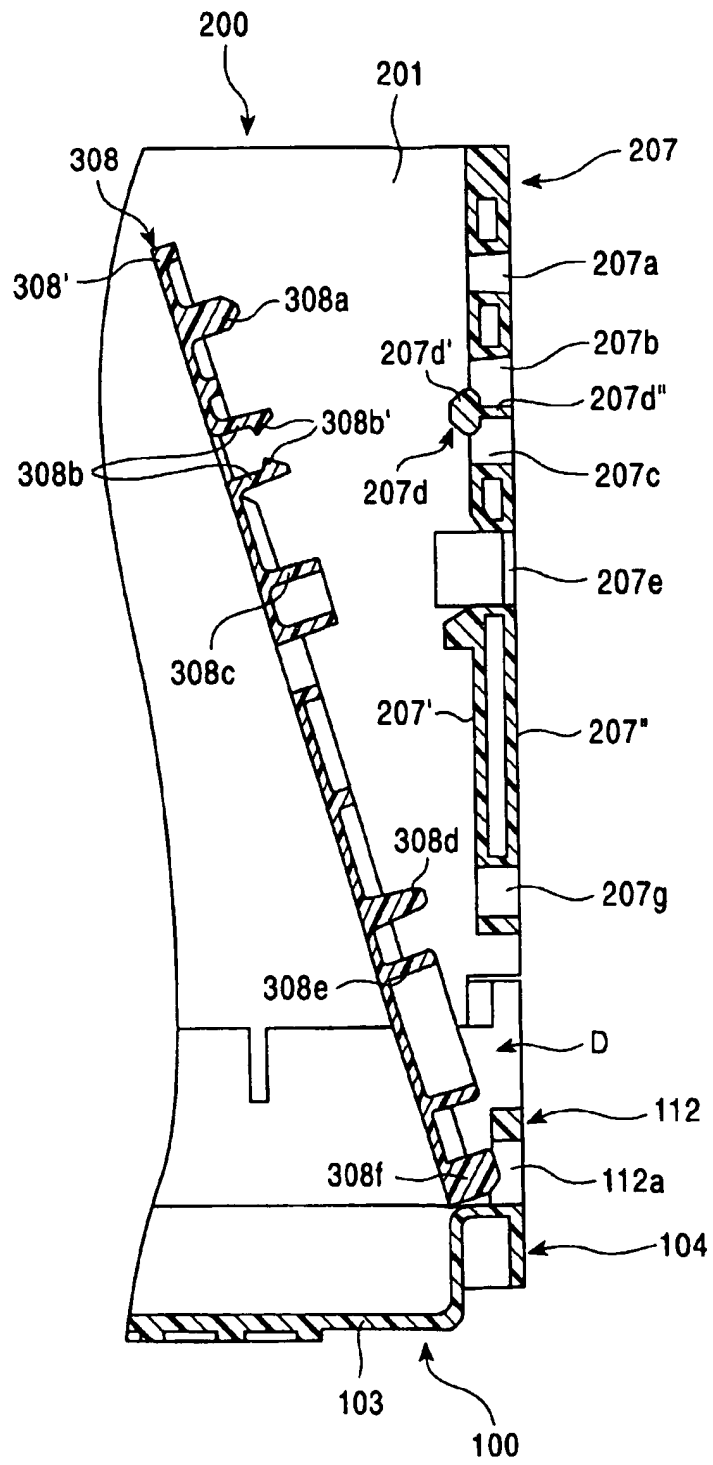


FIG. 11

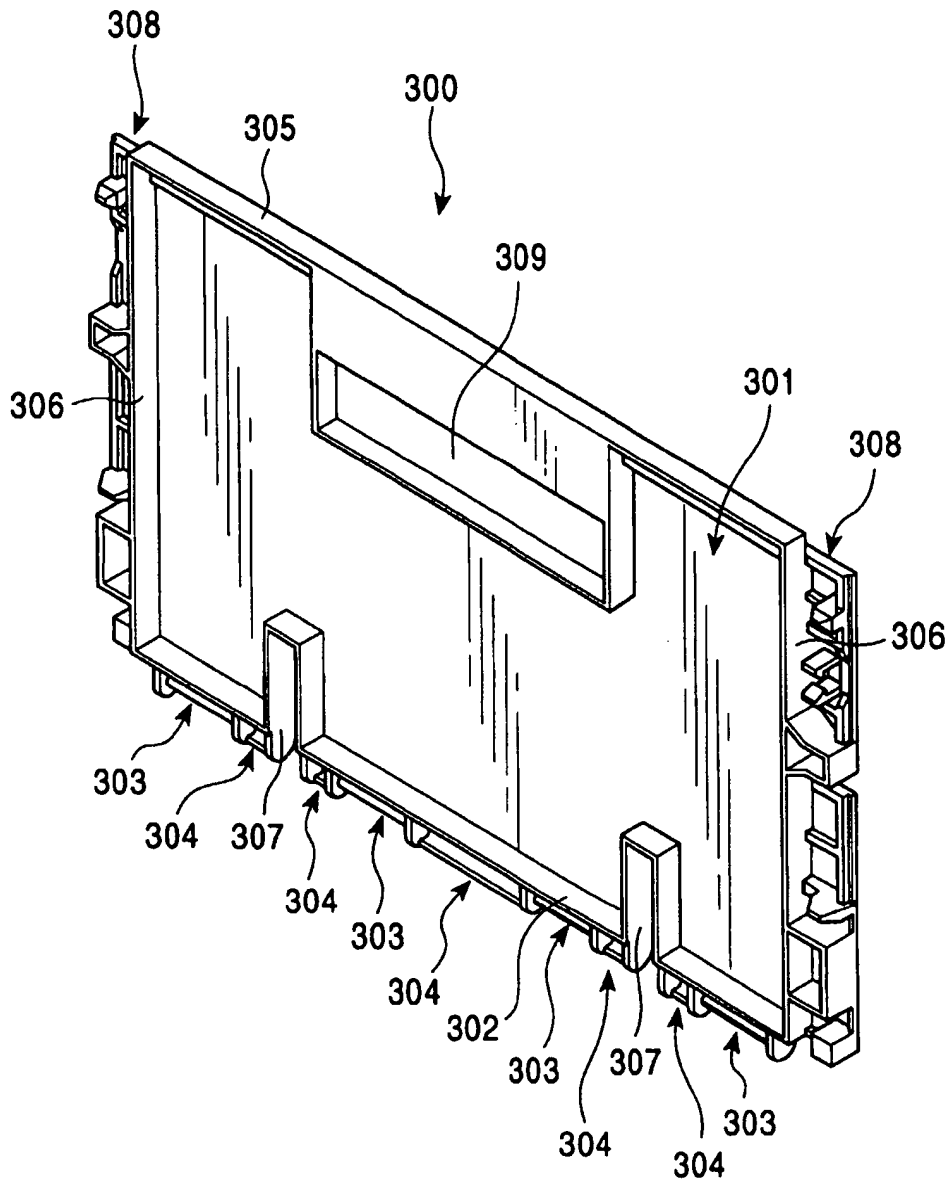


FIG. 12

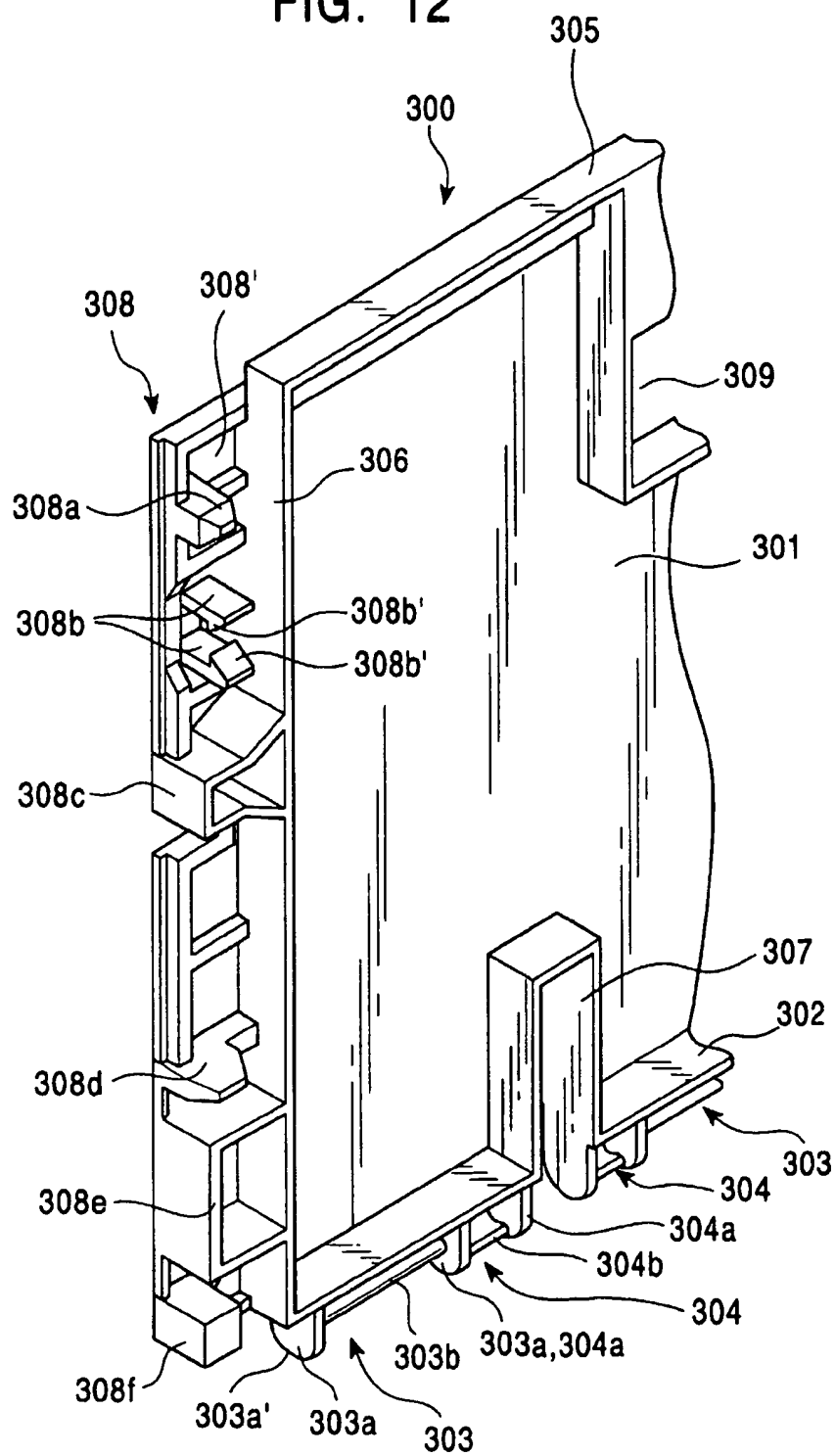


FIG. 13

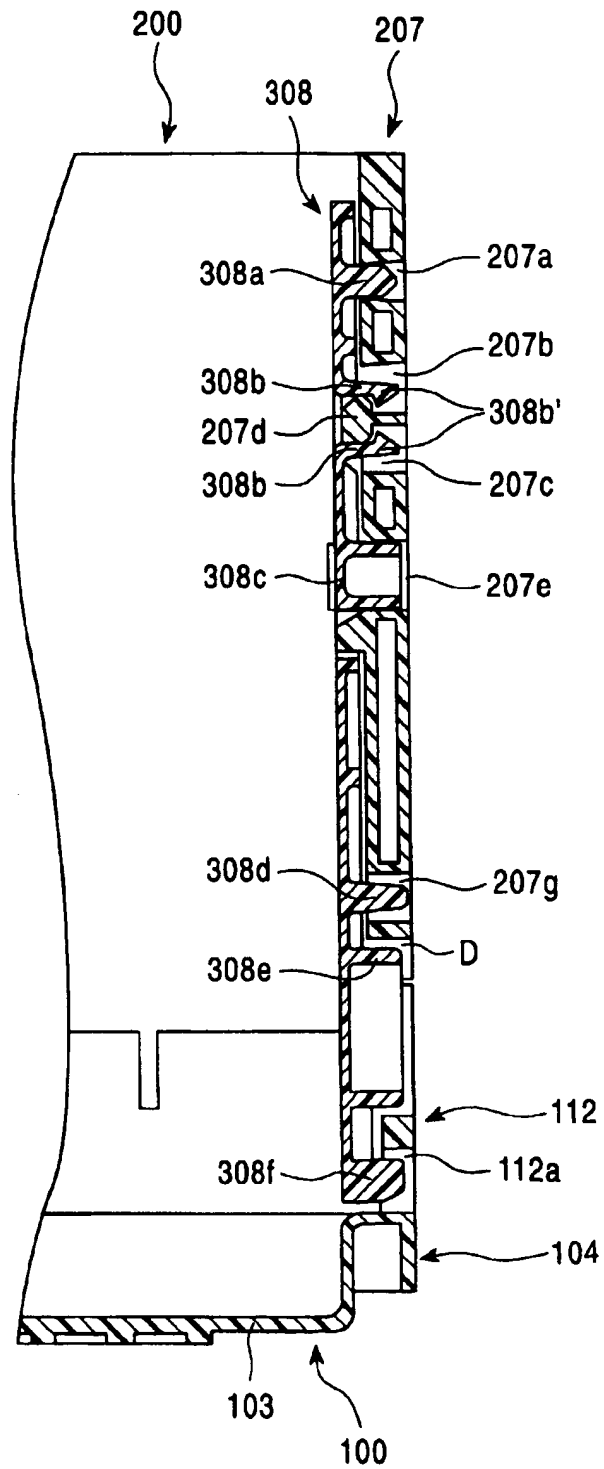


FIG. 14

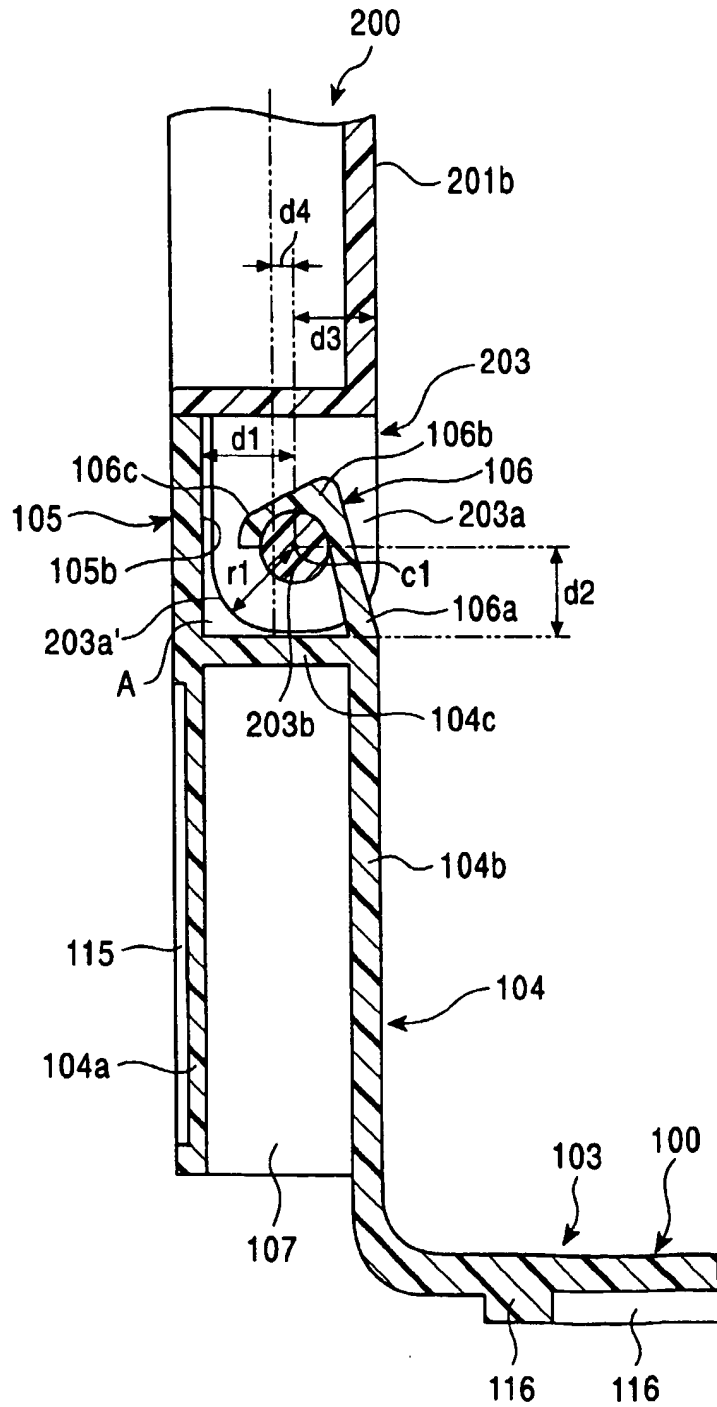


FIG. 15

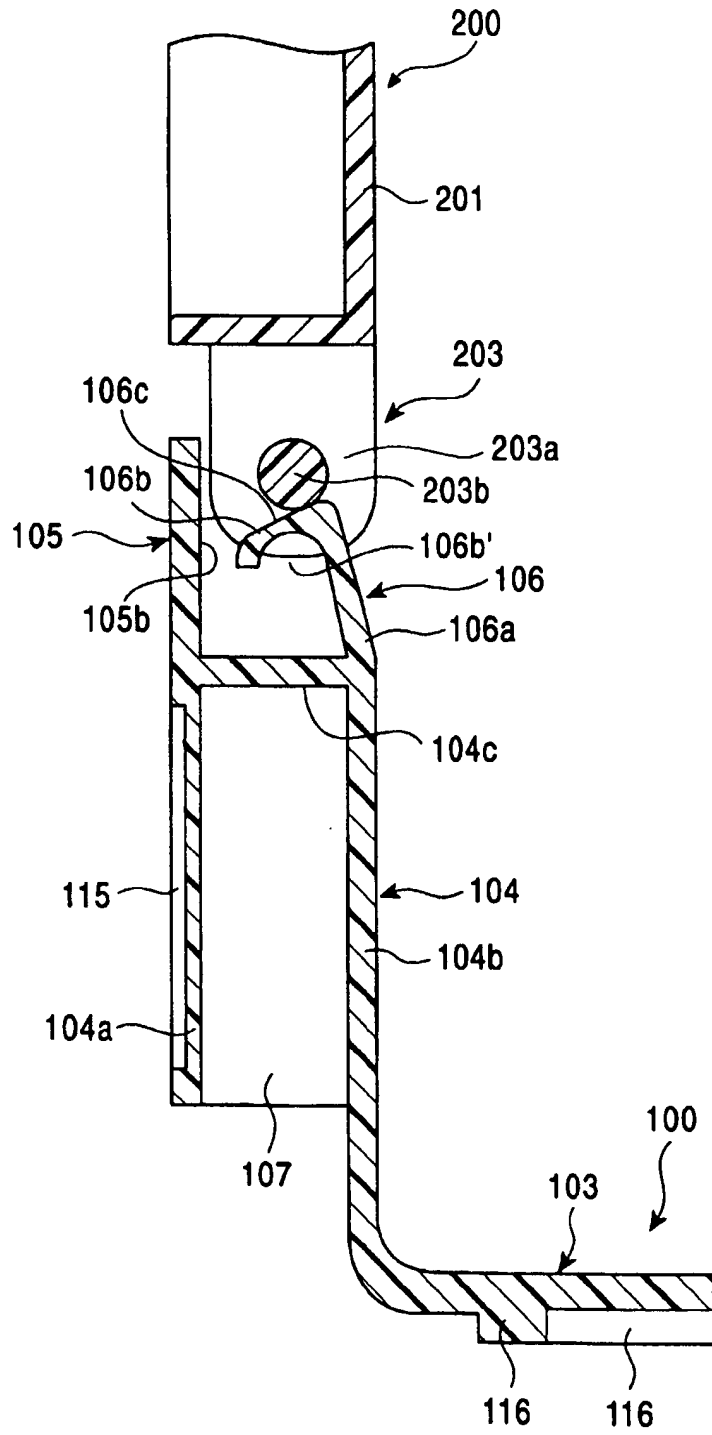


FIG. 16

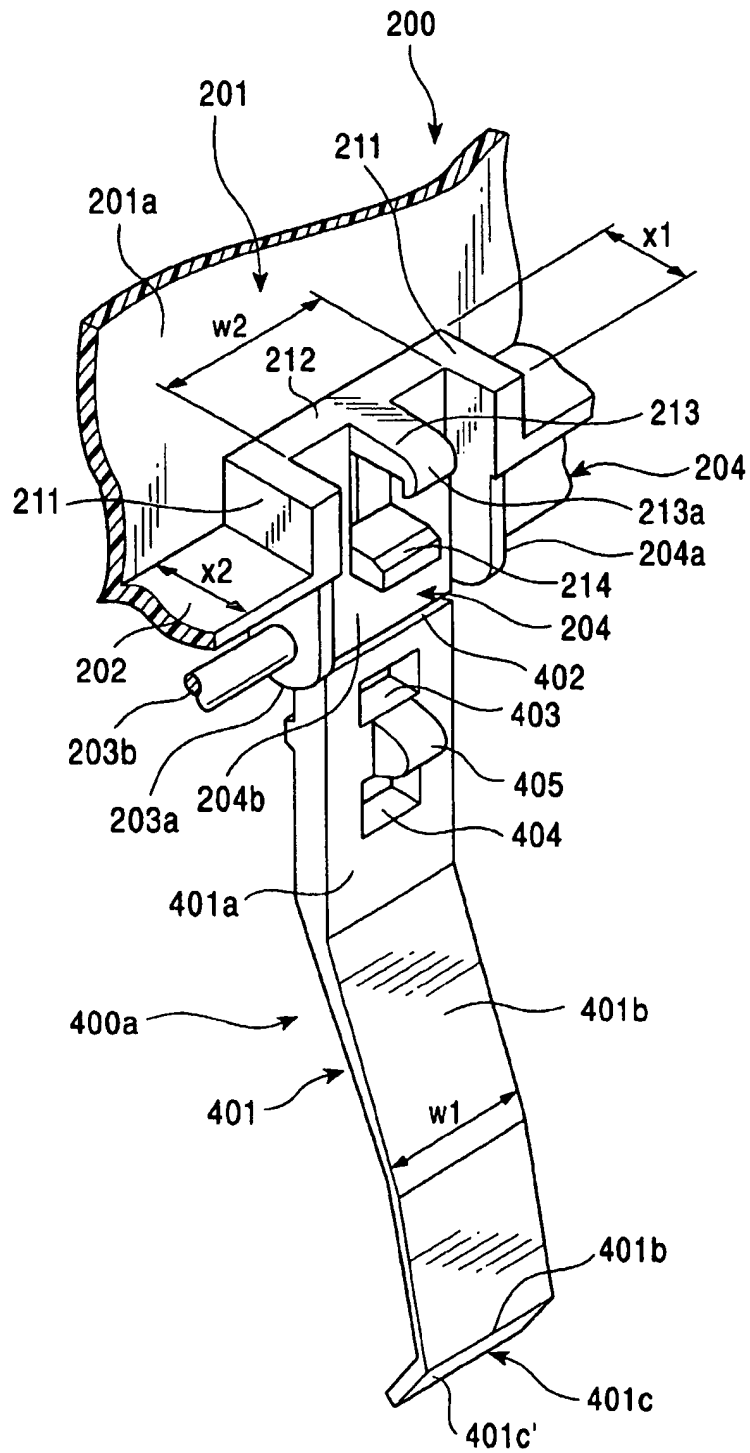


FIG. 17

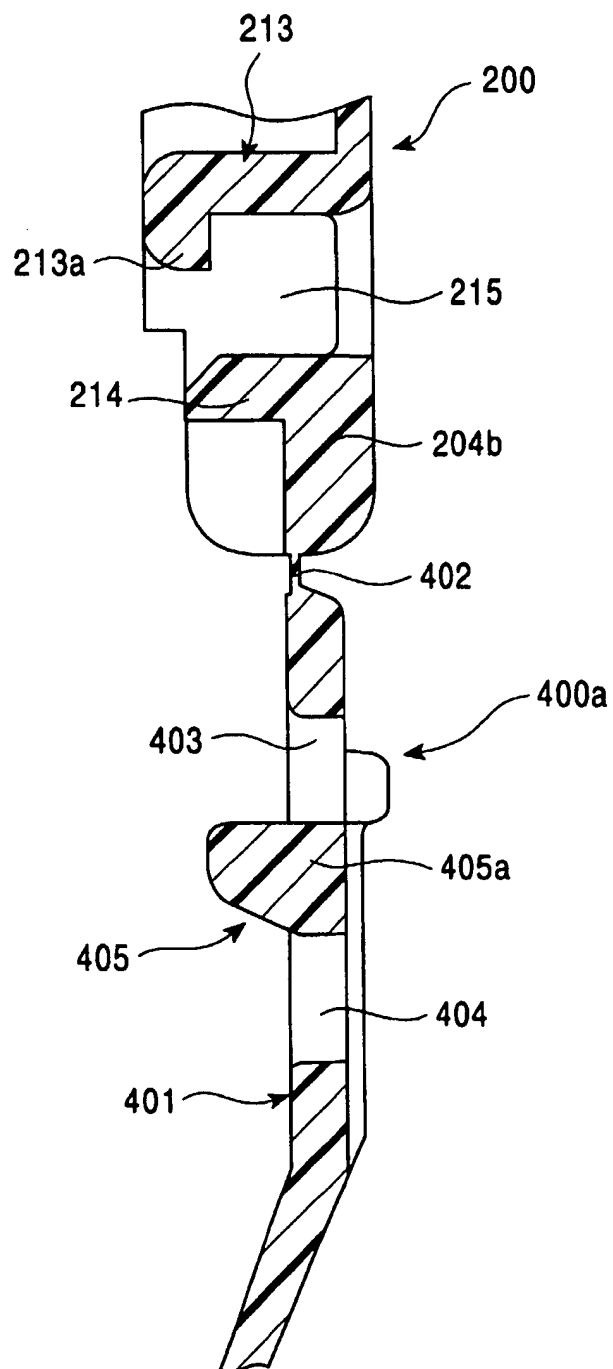




FIG. 18

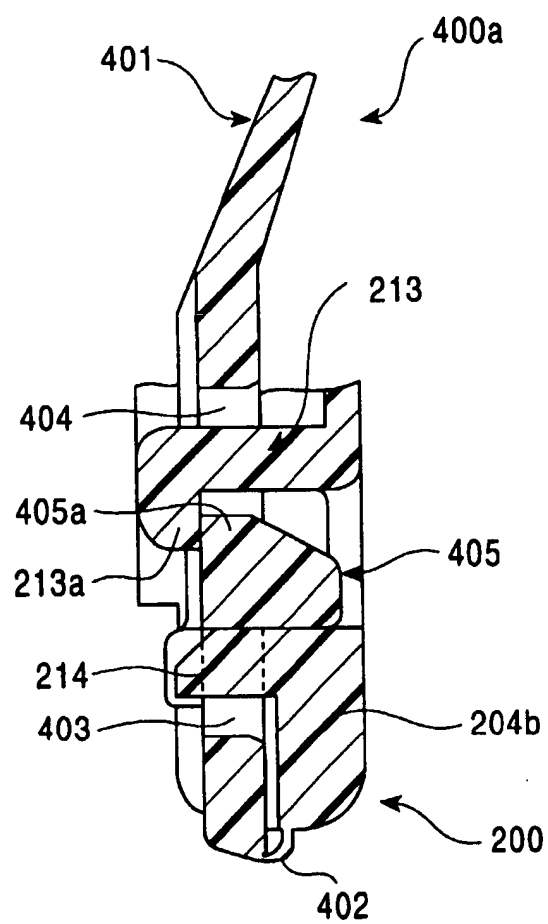


FIG. 19

